JUNE, 1931 NUMBER 273

THE UNIVERSITY OF NORTH CAROLINA RECORD

THE GRADUATE SCHOOL

Announcements for the Session 1931-1932

GRADUATE SCHOOL SERIES No. 23

THE UNIVERSITY OF NORTH CAROLINA PRESS
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CHAPEL HILL, N. C.

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CALENDAR

1931

June 6-9	*Saturday through Tuesday.* Commencement exercises.
June 11-July 21	Summer quarter, first term.
July 22-August 28	Summer quarter, second term.
September 17	*Thursday.* Registration for the fall quarter.
September 18	*Friday.* Class work for the fall quarter begins.
September 25	*Friday.* General meeting of the Graduate School, 8.00 P.M., Smith Building. Last day for approval of applications for the degree of Ph.D. at commencement of 1932.
October 12	*Monday.* University Day.
Nov. 25	*Wednesday.* Thanksgiving recess begins (1:00 P.M.).
Nov. 30	*Monday.* Thanksgiving recess ends (8:30 A.M.).
Dec. 16, 17, 18, 19	*Wednesday, Thursday, Friday, Saturday.* Examinations for the fall quarter. Registration for winter quarter for students in residence.
Dec. 19 (afternoon)-Dec. 31, 1931	Christmas recess.

1932

Jan. 1	*Friday.* Registration completed for the winter quarter (new students only).
Jan. 2	*Saturday.* Class work for the winter quarter begins. Regular classes as of Friday.
Jan. 8	*Friday.* Applications for admission to candidacy for master's degree at commencement of 1932 must be approved by this date. Last day for approval of thesis subjects for master's degree at commencement of 1932.
Mar. 9-12	*Wednesday through Saturday.* Examinations for the winter quarter. Registration for spring quarter for students in residence.
Mar. 12-18	*Saturday afternoon through Friday.* Spring recess.
Mar. 19	*Saturday.* Registration completed for the spring quarter (new students only.)
March 21	*Monday.* Class work for the spring quarter begins.
April 2	*Saturday.* Applications for admission to candidacy for master's degree at August commencement of 1932 must be approved by this date. Last day for approval of thesis subjects for master's degree at the August commencement of 1932.
April 23	*Saturday.* Last day of period for written examinations for master's degree. Last day for submitting theses for the degree of Ph.D.
April 30	*Saturday.* Masters' theses must be submitted. Written examinations for the degree of Ph.D. may not be taken after this date.
May 30-June 2	*Monday through Thursday.* Examinations for the spring quarter.
June 4-7	*Saturday through Tuesday.* Commencement.

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* Absent on leave, 1930-31, with the Institute of Social and Religious Research.
† Absent on leave, fall quarter, 1930, on Kenan Foundation.
‡ Absent on leave as chief of the Social Science Division, "A Century of Progress," Chicago World's Fair Centennial Celebration, 1933.

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* Absent on leave, 1930-1931, with the Institute of Social and Religious Research.
† Absent on leave, fall and winter quarters, 1930-1931, on the Kenan Foundation.
‡ Absent on leave as chief of the Social Science Division, "A Century of Progress," Chicago World's Fair Centennial Celebration, 1933.
¶ Absent on leave, winter and spring quarters, 1931, on the Kenan Foundation.
§ Absent on leave, fall quarter, 1930, on the Kenan Foundation.

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*Marion Rex Trabue, Ph.D., Professor of Educational Administration.
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‡Luther Lee Bernard, Ph.D., Professor of Sociology.
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Herman Glenn Baity, Sc.D., Professor of Sanitary and Municipal Engineering and Acting Dean of the School of Engineering.
James Penrose Harland, Ph.D., Professor of Archæology.
**George Francis Bason, M.E.E., Professor of Electrical Engineering.
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* Absent on leave, spring quarter, 1931, through winter quarter, 1932.
§ Absent on leave, fall quarter, 1930, on the Kenan Foundation.
† Absent on leave, winter and spring quarters, 1931, on the Kenan Foundation.
‡ Absent on leave, 1930-1931.
¶ Absent on sick leave, 1930-1931.
** Absent on sick leave, fall quarter, 1930; resigned, January 1, 1931.

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William Sumner Jenkins, Ph.D., Assistant Professor of Government.

* Absent on leave, 1930-1931.

THE GRADUATE SCHOOL

INTRODUCTION

The Graduate School of the University of North Carolina is a natural outgrowth of the history of the institution, since an interest in research has from the beginning been a part of that history. To foster the spirit of investigation was a fulfillment of the injunction in the Constitution of North Carolina, adopted in 1776, that "all useful learning shall be duly encouraged, and promoted in one or more universities." Chartered in 1789, the University before its formal opening in 1795, by acquiring apparatus by purchase in 1792, manifested its desire to promote scientific research in physics and astronomy. This same desire was evident when President Caldwell was, in 1824, sent by the trustees to Europe to purchase books and additional scientific equipment. It has been stated that this interest "led to the establishment of the first astronomical observatory in the United States, to the first geological survey by public authority in America, and to the first equipment for the teaching of electricity."

Although the limited library facilities in the early days made possible very little research achievement in the humanities, in science the work accomplished won respect in and out of the state. Members of the faculty during the first seventy-five years of the University's history were authors of textbooks and scientific monographs. After 1876 publications of this type became more numerous, and several research societies were established at the University, the proceedings of which were published in the learned journals maintained by the institution. In days of limited equipment and of inadequate income, remote from great libraries and laboratories, working under conditions that would have quenched a spirit less vital, members of the University were, nevertheless, impelled to devote themselves to research. For more than a century, therefore, the spirit of investigation has been a very real element in the life of the University; it has constituted a tradition of rich value from which future work is to derive inspiration and authority.

No formal division of graduate study was established prior to 1876, although a plan for instruction leading so far, at least, as the master's degree was contemplated in the project of General William R. Davie, one of the founders of the University. After the fashion of the day, it was possible for a member of one of the so-called learned professions to obtain a master's degree on the basis of experience and on that of the successful practice of the profession. Advanced work was offered, however, and higher degrees in course were granted. The Catalogue of 1854 laid down a rule for such work.

BEGINNINGS OF GRADUATE WORK

Following the Civil War and during a part of the distressing period of Reconstruction the doors of the University were closed. With the reopening of the institution in 1875, the authorities proceeded almost immediately to establish graduate study as a recognized University enterprise. The Catalogue of 1876 announced that postgraduate courses leading to advanced degrees would be offered. The regulations governing the master's degree were as follows:

> The Master's Degree will be open to any Post-Graduate who has taken the Bachelor's Degree in the same Courses in the University or in any institution whose requirements are equal to our own, provided he shall pass one year in post-graduate studies at the University, shall pass his examinations and present a satisfactory thesis on some subject within the department of study especially pursued.

It will be readily appreciated that in this brief statement were incorporated sound principles. In 1877, the degrees of Master of Arts, Master of Science, and Doctor of Philosophy were announced. They were to be conferred only "upon rigid examinations on prescribed courses." The degrees of Master of Arts and Doctor of Philosophy were awarded under this new system in 1883. In 1885 a further significant step was taken to effect a formal separation of graduate and undergraduate work, and courses open only to graduate students were listed in the fields of constitutional law, political economy, classical languages and literature, English language and literature, French, German, mathematics, chemistry, natural philosophy, and geology, botany, and zoölogy.

At about the same time (1883) the impulse to further research at the University gained new strength through the establishment of the Elisha Mitchell Scientific Society. For the first three years the Society published annual volumes of proceedings; afterwards the journal became a quarterly. From the first the society has emphasized original research on the part of its professors and advanced students and has been an aid to scientific work at the University. The Philological Club established an annual record of research, called *Studies in Philolgy*, in 1906. The *James Sprunt Historical Studies*, founded in 1899, gave opportunity for the publication of the results of advanced research in history, particularly in the history of North Carolina.

The establishment of these three learned journals in the fields of science, history, and philology, together with the activities of the research clubs which have held monthly meetings now for many years, afforded a great stimulus to investigation at the University and increased recognition of the importance of graduate work. In 1904 the graduate department was formally organized as a distinct school of the University and the late Professor C. Alphonso Smith was appointed as its first dean.

FIELDS OF RESEARCH

Information concerning the laboratories and scientific equipment and the library facilities afforded graduate students will be found in the various departmental statements at another place in this catalogue. Some of the fields in which conspicuous contributions to learning have been made in recent years are as follows:

Languages and Literatures

The Department of Classics in the recent past has centered its researches in the fields of Latin literature—particularly the poetry of the first century B.C. and the historical writings—and of Roman political institutions. The addition of a new member to the staff now gives assurance of promoting studies also in classical art and archæology.

In Comparative Literature, attention has been given especially to the Classics, to the Renaissance in the several countries of Europe, and to the romantic movement in Europe and America.

The special fields which have been emphasized for investigation in the Department of English are Middle English, the Renaissance, the English drama, and American literature. Library facilities in these subjects have been built up to a reasonably adequate position. Some of the doctoral dissertations recently accepted by the Department are: "Reflections of Current Social and Political Conditions in Milton's Major Poetry"; "Elizabethanism in Victorian Poetic Drama"; "The Influence of the German Tale on the Tales of Irving, Hawthorne, and Poe"; "A Study of Henry David Thoreau as a Critic of Literature"; "Vaudeville Elements in English Drama from the Origins Until the Closing of the Theatres in 1642"; "Folk-Songs of Mississippi and Their Background—A Study, with Texts"; "Economic Unrest in American Fiction, 1880-1901"; "Herbal Lore as Reflected in the Works of the Major Elizabethans"; "Formative Influences in the Mind and Writings of Mark Twain."

The Department of Germanic Languages is engaged at present in investigation of problems connected with Goethe, the Romantic School, Hebbel, the Old Saxon *Heliand*, the Old High German *Evangelienbuch* of Otfrid, and the bilingual (Latin and Old High German) *Evangelien-Harmonie* of Tatian.

The Department of Romance Languages has devoted itself particularly to investigations in Renaissance and Medieval French literature, romance linguistics, and French romanticism. In the field of Spanish the stress has been laid upon romantic drama, Old Spanish, and Spanish-American literature. A full array of courses is offered in these specialties and in the general field as well. Recent doctoral dissertations are: "The Doctrine of Literary Obscurity in the French Renaissance"; "An Edition of *Les Chetifs*, an Old French Crusade Epic, with introduction, variants, and notes"; "*The*

Romance of the Rose in the Middle French Period"; "The Style and Literary Tendencies of Stendhal in His Novels"; "The Dramatic Works of Gil y Zárate"; "The Attitude of the Spanish Romantic Dramatists Toward History."

Philosophy and Political and Social Sciences

Investigations of problems of immediate regional concern are characteristic of the departments of Economics and Commerce, Rural Social-Economics, and Sociology. Aspects of the labor problem, commercial geography, port and terminal control, transportation, and business cycles, as well as specific matters of importance to Southern manufacturing and commerce, form one aspect of the work of these departments. In some of these investigations other departments coöperate, such as Chemistry, Geology, and Engineering. County and municipal government is studied from one point of view by the Department of History and from a different angle, based on field work as well as books and documents, by the Department of Rural Social-Economics. A number of reports on these and similar subjects are made by students and members of the staff each year, and are distributed in printed form. In sociology, attention is at present directed toward studies of the family, social theory, race, crime, mill villages, and human geography. Many of these studies are directed or aided by grants made by the Institute for Research in Social Science, which is supported by substantial funds. Ten research assistants besides the departmental staffs are engaged in the investigation of matters affecting social welfare in the South.

The Department of History and Government has for many years been primarily interested in various aspects of Southern history, state history, Hispanic-American history and government, American history and government, and political science, and has published many books and monographs in these fields. Advanced courses and research guidance are available in these fields not only, but in ancient, medieval, modern European, and English history. The department, by reason of the rich store of manuscripts and source materials in the Library, is especially well prepared to offer graduate work in general American and Southern history.

In Education research is carried on in the history of education in the South; in specialized aspects of educational psychology, such as the psychology of discipline, of learning, and of individual differences; in elementary education; in secondary education; and in the various aspects of educational administration and supervision. The research problems on which members of the School of Education are working have been taken directly from the public educational institutions of the state and section. The problems considered during the past few years have concerned the teachers, the courses of study, the results of instruction, the organization, the administra-

tion, and the supervision of elementary, secondary, and collegiate institutions. Special attention has been given recently to the results of instruction in English, to the organization and conduct of secondary schools and teacher-training institutions, and to the history of present conditions in Southern schools. The Bureau of Educational Research serves as a permanent center for organizing, conducting, and assembling the results of all types of educational research projects. Through this bureau many public school officials and sectional organizations have been stimulated, assisted, and directed in significant investigations of vital educational problems.

Mathematics and the Sciences

Research in Botany has included studies of the flora of the Carolinas, and of the reproduction and physiology of the higher fungi and water-molds. One volume on the trees of North Carolina has appeared. Contributions from the Department appear at frequent intervals. In recent years these have been concerned chiefly with fungi, and include three books and numerous monographs of genera. In Zoölogy, the principal lines of investigation have been the embryology and regenerative processes in sponges, coelenterates, and the lower vertebrates, the systematic zoölogy of sponges and crustacea, and the life-cycles of protozoa. Numerous monographs embodying the results of these investigations have appeared in the zoölogical journals.

The Department of Pharmacology has contributed many monographs on acute and chronic Bright's disease, on the toxicity of anaesthetics and its prevention, and on the influence of age on certain physiological conditions. Studies concerning the influence of the age of an organism in maintaining the acid-base equilibrium of the blood, as well as studies on the toxaemias of pregnancy, epithelial repair in the kidney, the resistance acquired by a changed type of epithelium, and the prevention of pregnancy toxaemias by the use of glucose, are also being carried on.

In Chemistry, some of the lines of work are the chemistry of dyes and intermediates, physical properties of explosives and intermediates, phase rule systems, chemistry of rare earths, utilization of wastes, utilization of local coal, and investigations of analytical methods.

Engineering research projects of considerable importance are being carried on by the School of Engineering. During the past eight years this division of the University has coöperated with various federal and state agencies, municipalities, corporations, and engineering and research organizations in studies and investigations that have resulted in the development of data and information of great value. For five years the Department of Civil Engineering has conducted an extensive series of experiments to determine friction and cohesion factors on earth and the pressures on culvert pipes of various types

and sizes under different conditions of fill. Investigations of rainfall, stream flow, and beach erosion have been made in coöperation with the State Department of Conservation and Development. Studies on filter sands, water, sewage and industrial waste treatment, chlorination, mosquito and malaria control, stream sanitation, and allied public health problems have been carried out coöperatively with the State Board of Health. Extensive research has been conducted on columns, rigid frames, and welded joints. In Electrical Engineering studies are being made on vacuum-tube amplifying circuits for thermocouples. In Mechanical Engineering research is in progress on the cyclic heat flow in spherical bodies and the response of thermocouples to rapidly oscillating temperatures. The Department of Chemical Engineering is engaged in investigations of the elimination of sulphur from North Carolina coals, the recovery of alkalis from North Carolina feldspars, and on crystallization and filtration.

In Geology, twelve different research projects are now being carried on. Seven of these deal with the geology of North Carolina, and five are outside the state but in eastern or southeastern United States. These investigations range from pure science to practical problems in economic geology.

In the Department of Mathematics investigations are carried on in relativity, higher geometry, higher algebra, calculus of variations, and projective differential geometry. The Department of Physics has centered its research on the problems of the structure of matter and infra-red absorption spectra. It possesses special facilities for work in problems dealing with atomic structure, spectrum analysis in the ultra-violet, infra-red, and allied problems.

Investigation in the field of Psychology has in the past followed three lines especially: the analysis of cases of psychopathy, human habit-forming in its more complicated phases, and the analysis of technique for measuring animal intelligence. Special encouragement is now also to be given research in problems of personnel. Research studies of both faculty and advanced students in this department have appeared from time to time in leading psychological journals.

JOURNALS OF RESEARCH

Five journals devoted to research in different fields of learning are maintained by the University. *The Journal of the Elisha Mitchell Scientific Society*, now in its forty-sixth volume, has published a very large number of scientific papers, particularly in chemistry, botany, and zoölogy, and is regarded in this country and abroad as one of the most distinguished journals of its kind. The *James Sprunt Historical Studies*, now in its twenty-first volume, is a series of original papers, chiefly on North Carolina history, contributed by professors and advanced students in the Department of History. *Studies in Philology*, now in its twenty-eighth volume, originally

was limited to the publication of research in philology carried on by members of the language departments at the University. In 1915 it became a quarterly, and now admits to its pages articles by scholars in other universities as well as by members of the language departments of the University. In April of each year it publishes a series of papers dealing with English literature of the sixteenth and seventeenth centuries, called "Elizabethan Studies." The journal is now recognized as one of the foremost American journals of philology. *The North Carolina Law Review* and *Social Forces* were added to the list of research journals published by the University in 1922, and all these journals are now issued by the University of North Carolina Press, established in 1922.

THE UNIVERSITY PRESS

In addition to the journals of research, the University of North Carolina Press publishes books and monographs of research, as well as textbooks and general literature. The major purpose of the Press is to give the University standing in the field of publishing commensurate with its standing in the field of teaching and investigation. It also provides, through books as well as through the scholarly journals, for the publication of the results of investigations carried on by members of the faculty and advanced students. But it is by no means limited, in accepting manuscripts, to work submitted by members of the University group. Books of distinction by scholars connected with other institutions may be published by it; thus the Press is a valuable aid in the development of that aspect of the University's service which has to do with the advancement of learning.

THE LIBRARY

The University Library occupies a new building, the first and principal unit of which was completed in July, 1929. This unit, constructed and equipped at a cost of $625,000, has a capacity of half a million books and about a thousand readers, in addition to work space for the library staff. Special arrangement has been made for graduate students in the provision of one hundred carrells in the bookstack for individual study, and seminar rooms on the third floor for study and discussion.

General Library. The general library contains over 225,000 volumes, constituting one of the largest collections in the South. It has been built up with great care, the purpose being to make of it an effective working library, a laboratory for the use of students in those departments in which research must be carried on mainly by means of books, as well as an instrument contributing to general culture. The collection increases at the rate of from 12,000 to 15,000 volumes per year, through gift and purchase. Notable among the special collections is that of North Caroliniana, which

contains several thousand volumes and constitutes the most complete library of North Carolina history and literature in existence; the chemistry collection, which in number of complete sets of American, English, German, French, and Italian periodicals is unequaled in the South; the rural social-economics collection; the English collection, which contains the complete publications of most of the important societies interested in the study of the English language and literature, the C. Alphonso Smith library of Southern literature, and the Pendleton King collection; the Nash collection of books relating to romance languages and literature; and the Elisha Mitchell Scientific Society collection, comprising the exchanges received since 1884 from more than two hundred of the leading scientific societies throughout the world. The collection of the Hanes Foundation for the Study of the Origin and Development of the Book comprises over 360 incunabula; a considerable collection of critical apparatus for the study of rare and early books; 500 books illustrating the development of printing from the fifteenth century to the present day; a collection of Babylonian and Sumerian clay tablets, and other materials depicting the development of the written record. The Hunter Collection of Manuscripts and Rare Books contains 100 incunabula and 100 manuscripts ranging from the fifteenth to the seventeenth century.

Departmental Libraries. The Law Library, containing 23,000 volumes, is in the building occupied by the Law School. It contains material useful to students of history and government. Advanced students also have the privilege of using the valuable manuscripts of the State Historical Commission and the State Library at Raleigh. The School of Commerce and the Department of Economics maintain a reading room in the general library building adjacent to the bookstack containing relevant books. It receives 365 trade and financial journals, including the leading publications in this field.

The University Library receives about 3,200 periodicals annually. The learned journals which record contemporary research in all the great fields of investigation, such as the sciences, history and economics, philosophy and sociology, classical and modern foreign languages and literatures, and English philology, folklore, and literature, are available. The Library is a member of important philological, bibliographical, and scientific associations, and receives their publications regularly. Bound volumes of most periodicals of permanent worth are available from the beginning of their publication, constituting a working collection of great value to advanced students. The Library also receives the publications of such organizations as the Smithsonian and Carnegie institutions, the Rockefeller Institute, and the Russell Sage Foundation, and of many universities, including foreign universities, which issue monographs of advanced research. It enjoys the privilege, through an inter-library loan arrangement, of borrowing from other libraries, for the use of graduate

students, publications which it does not possess. The Library is the regional depository of the catalogue cards issued by the Library of Congress, and is a depository for United States government documents.

Graduate students are given, on application, cards of admission to the bookstacks so that they may have immediate access to the stores of the library.

SITUATION AND GENERAL ADVANTAGES

The University is situated at Chapel Hill, twelve miles from Durham and thirty miles from Raleigh. It may be reached by rail from University Junction, or by one of the automobile lines which maintain frequent schedules from Durham. It is near the center of the state, midway between the mountains and the sea.

Several endowed lectureships are maintained by the University. The McNair Lectureship, founded in 1906 by the will of John Calvin McNair of the class of 1849, provides for an annual series of lectures by visiting scholars of distinction, and for the publication of the lectures in book form. The Weil lectures in American Citizenship, founded by Mr. Sol Weil and Mr. Henry Weil of Goldsboro, were inaugurated by former President William Howard Taft in 1914-1915.

In addition to these special courses and lectureships, a student lecture course provides each year many single lectures by well-known people. Some of these are of scholarly nature, others are popular. There are many entertainments of various kinds under the direction of the University. Notable among these are the Sunday afternoon recitals conducted by the Department of Music, the concerts and recitals by various University musical organizations, and the productions of dramatic work by The Carolina Playmakers. The plays are written by students in English 55 and are produced by them, under the direction of Professor Frederick Koch, at The Playmakers Theatre.

In the various departmental clubs students engaged in work in special fields find opportunity for the discussion of problems of mutual interest. The Graduate Club, an organization directed and controlled by the graduate students for the purpose of discussion of common interests, meets monthly and affords an opportunity for social intercourse and the development of an *esprit de corps* among graduate students. All graduate students are eligible for membership.

ORGANIZATION OF THE GRADUATE SCHOOL

Work for advanced degrees in the University of North Carolina is under the supervision of the graduate faculty, which consists of those officers of professorial rank who are chiefly interested in the Graduate School, either because they offer courses for graduate students or because of their interest in research. The immediate direction of the Graduate School is in charge of an administrative board, of which the Dean is chairman, consisting of ten members of the faculty who represent the three divisions under which the courses offered by the graduate faculty are listed.

These divisions, with the departments constituting each, are as follows:

I. *The Division of Languages and Literatures*
- The Department of Classical Languages and Literatures
- The Department of Comparative Literature
- The Department of English
- The Department of Germanic Languages
- The Department of Romance Languages

II. *The Division of Philosophy and of Political and Social Sciences*
- The Department of Economics and Commerce
- The Department of Rural Social-Economics
- The Department of Education
- The Department of History and Government
- The Department of Philosophy
- The Department of Sociology and Public Welfare

III. *The Division of Mathematics and the Sciences*
- The Department of Botany
- The Department of Chemistry
- The Department of Civil Engineering
- The Department of Electrical Engineering
- The Department of Geology
- The Department of Mathematics
- The Department of Physics
- The Department of Psychology
- The Department of Zoölogy

ADMISSION AND OTHER INFORMATION

Admission

Holders of the bachelor's or master's degree from approved colleges are admitted to the Graduate School upon presentation of their credentials and without examination. If the institution from which the candidate comes is a member of the Association of American Universities or is recognized on the approved list issued by that Association, no special conditions are imposed, except that the undergraduate record must show the creditable completion of an amount of work in the special field in which the student proposes

to continue his work sufficient to constitute an undergraduate major. In case of insufficient preparation, or of transfer to a different department, certain prerequisite courses may be prescribed which do not carry graduate credit.

Students holding degrees from institutions not included in the membership of the Association of American Universities or on its accredited list may be admitted, provisionally, as special students. Such students may qualify as candidates for higher degrees, with the approval of the department and the administrative board, on the satisfactory completion of whatever prerequisite or additional work may be assigned, and after demonstrating, through records in graduate courses taken in one or more quarters of residence in the Graduate School, that they are qualified to do advanced work.

Credit for graduate work, not to exceed two full courses, may be transferred to the University of North Carolina from institutions recognized by the Association of American Universities. Such transfer must be recommended by the head of the department in which the student does his major work and is subject to the approval of the administrative board.

Formal application for admission to candidacy for an advanced degree is required of all regular students. This application may not be filed earlier than the first week of the second quarter of residence. The application must be accompanied by a transcript of the applicant's undergraduate record, except in the case of students who are graduates of this institution. It must be approved, in candidacy for a master's degree, at least five months before the degree is conferred; in the case of the doctorate, at least one academic year in advance. Approval of the application is dependent on the previous work of the student as shown by his undergraduate record; on the record made in the Graduate School prior to the time when the application is filed; on the certification, by the major department, that the student is qualified to continue advanced work, with a program of work prepared in satisfaction of the requirements for the degree; on the presentation of certificates of proficiency in the foreign languages required for the degree; and on the removal of any special conditions imposed by the department or by the administrative board.

It should be noted that this distinction between admission to the Graduate School and admission to candidacy for a degree does not necessarily involve any extension of the time required for the degree. Properly qualified students will register at once, with the approval of the departments interested, for such advanced courses as they wish to take, and all advanced courses completed according to the rules for graduate work will be credited toward the degree.

Fees and Expenses

The tuition in the Graduate School is $25.00 for North Carolina students and $50.00 for out-of-state students each quarter. Addi-

tional incidental fees, not including laboratory fees, amount to $24.66 a quarter.

Fellowships and Other Aids

Twenty-six University fellowships, each with a stipend of $500, are available to graduate students. These fellowships carry free tuition (not including laboratory fees) and are payable in nine monthly installments, beginning in October of the year for which they are awarded. Holders of these fellowships are expected to perform certain limited services as teachers or laboratory assistants in the department to which they are assigned. This department must be the major department of graduate study, and each holder of a fellowship will be required to pursue advanced courses in the department during his term as fellow.

Fellowships are awarded only to those who present satisfactory records as students and who give promise of being able to carry on advanced work with distinction. Teaching experience is desirable, but is not required.

Fellows are not permitted to hold any other office or position connected with the University, and they may not occupy any position outside the University during the term of the fellowship, or engage in any work for pay without the written permission of the Dean.

Correspondence in regard to the teaching fellowships may be addressed to the Dean or to the head of the department in which the candidate proposes to do his major work. A special form of application, to be secured from the Dean's office, must be filed before March 15. Elections to fellowships will be made by the administrative board of the Graduate School, on nomination by the department to which the fellowship is to be assigned. Since the University is a member of the Association of American Universities, the rules of that Association in regard to fellowships are followed.

Twenty University scholarships are available to both men and women on the same general terms as those governing the fellowships. These scholarships carry remission of tuition fees and require no services. They are open to candidates in any department represented in the Graduate School.

A limited number of appointments as teaching assistants are also available. The stipend ranges from $500 to $800, and tuition fees are remitted. They require approximately half-time teaching, the remainder of the time being devoted to advanced study in the department in which the appointment is held. Application for assistantships should be made to the head of the department concerned.

Special Fellowships

In addition, two fellowships—the Graham Kenan Fellowships—carrying stipends of $700 each are open to men and women who wish

to major in philosophy; and one, the Ledoux Fellowship, with a stipend of $300, to students majoring in chemistry.

Fellowships in Engineering

Through the coöperation of the Water Resources Division of the North Carolina Department of Conservation and Development, a fellowship is offered annually for research work in water resources, with particular reference to hydrology. From time to time other fellowships are given by municipalities and industries for the prosecution of special research studies and investigations. Applications for these fellowships should be made to the Dean of the School of Engineering.

Loan Funds

Each year the Chapel Hill Branch of the American Association of University Women makes available for the use of women graduate students a loan fund of $100. Applications for this fund should be made to the Dean of the Graduate School. Besides this special loan fund, the general loan funds, announced in the University catalogue, are open to graduate students. Applications, approved by the Dean of the Graduate School, should be made to the Dean of Students.

The Research Prizes

A prize of fifty dollars is offered each year for outstanding research done by graduate students in each of the three major fields of graduate study: languages and literature, pure sciences, and history and social sciences. The administrative board of the Graduate School reserves the right to withhold any or all of these prizes if, in its judgment, no outstanding work has been done.

The Institute for Research in Social Science

The increasing emphasis placed upon the social sciences within recent years and the need for scientific research in this field have given rise to a number of organizations for promoting research, such as the Social Science Research Council and several of the national foundations which have set aside major portions of their funds for this purpose. In history, government, economics, sociology, jurisprudence, anthropology, statistics, social psychology, and other related fields there is need for new standards of research, for coördination, and for correlation.

At the University of North Carolina there had been for some time special need for assistance if the many investigations in the social sciences, already under way or projected, were to be carried out. It was a fortunate circumstance, therefore, when the Institute for Research in Social Science was made possible in 1924 by a special grant from the Laura Spelman Rockefeller Foundation and University appropriations. An extensive program of regional research, including

studies in local government, southern historical backgrounds, socio-economic activities including studies in social-industrial relationships, crime and criminal justice, the Negro, folklore and folk backgrounds of the southern people, social institutions, public welfare and child welfare, human geography of the American South, has been developed and is under way by means of concrete projects in the several fields. Accordingly, the scope of the program includes the social sciences, broadly construed, and the emphasis is upon projects and problems rather than upon disciplines. Research projects, while chosen for the most part from the state and regional field, are selected with a view to their generic value and for their possible contribution in both method and content.

The permanent staff of the Institute is composed of research professors and associates, who, in addition to their own researches, direct other researches and may give courses in line with their special subjects. There are also a limited number of research assistants on yearly appointment. These research assistantships are open to men and women who have shown ability to do original research. A master's degree or the equivalent in research experience constitutes the minimum requirement for appointment. All appointments are made on a twelve months' basis. The awards are in no sense fellowships, but each appointment is made with the definite purpose in mind of assisting specific research in the social sciences under the direction of professors and associates. Such assistantships carry with them stipends varying from $750 to $1,500.

Additional information and application blanks for appointment may be had by writing to the Institute for Research in Social Science, University of North Carolina, Chapel Hill, North Carolina.

Rooms and Board

The Smith Dormitory has been entirely remodeled and provides living quarters and club rooms for fifty-one male graduate students. A dining room is operated in connection with it. Women students are accommodated in Spencer Hall, which also provides dining facilities. The rates per month are as follows:

	Single Room	Double Room	Board
Smith Dormitory.....	$18.00—$25.00	$12.50	$30.00
Spencer Hall.....	20.00	12.50	30.00

Rooms are also available in town. Requests for room reservations for the Smith Dormitory should be addressed to Box C, Smith Dormitory; for Spencer Hall, to Mrs. Marvin H. Stacy, Adviser to Women. Board in town costs from $22.00 to $35.00 per month.

The University Year

Four terms, or quarters, of approximately eleven weeks each constitute the regular University year. In all of these terms graduate courses are offered, and students may register at the beginning of any term. The summer quarter is a component part of the University year, and the rules for admission and the requirements for advanced degrees are the same as in other quarters. The master's degree may ordinarily be attained in three summer quarters or an equivalent.

The unit of work is the course, by which is meant, as a rule, a class meeting five times a week. Half-courses are also offered. In some courses open only to graduate students, such as the seminars and other research courses, the formal class exercises are modified. But all such work is credited in terms of courses and half-courses.

Not more than three courses, or fifteen hours of class attendance, will be permitted. Students of more than one year's standing, candidates for the doctor's degree, are permitted greater latitude with reference to courses for which formal registration is required. Such considerations as the amount of time devoted to research, to work on the doctoral dissertation, and the like, weigh in the estimate of what constitutes full work. But in all such cases detailed reports by the department are required before residence credit is given.

Only work announced as open for graduate credit in this bulletin or the bulletin of the summer school session may be counted toward the higher degrees.

Work done *in absentia* will not be counted for graduate credit, except that in certain cases approved by the department and by the administrative board, part of the work on the thesis for a higher degree may be done elsewhere, and except, further, that part of the work required for the degree of doctor of philosophy may, on recommendation of the major department and with the approval of the administrative board be done at another university. But all such work, even when credited, is subject to examination at the finals required for the degree.

General Regulations

The following regulations of the graduate faculty should be observed:

1. Graduate students are subject to the same rules regarding faithfulness in performance of assigned tasks and regarding examinations and credit as students in other departments of the University. But graduate work pre-supposes a greater amount of time for research in the library or the laboratory; and the student, being more mature, is thrown more upon his own responsibility. For these reasons excessive registration is not permitted. The whole idea of graduate work is comprised in a more intense specialization and therefore

more complete investigation than is necessary or wise in undergraduate instruction. The administrative board will not count for credit toward a higher degree work done by students who, in the same session, are doing work toward a higher degree in any other graduate or professional school.

2. Grades for each course completed are reported to the Dean and to the Registrar. These grades are as follows:

High, which represents work of distinction.

Passed, which represents satisfactory work.

Failed, which represents work that is unsatisfactory for graduate credit.

No work falling below the standard represented by the grade of *Passed* is counted for graduate credit. If, in the judgment of the administrative board, the quality of the work done by any student falls below the standard expected of graduate students, the registration of such a student will be canceled.

3. Work taken more than five years before the date at which the master's degree is expected may not be used to count for credit toward that degree; and work taken more than ten years before the Ph.D. degree is expected may not be counted for credit toward that degree.

4. Each graduate student works under the direction of a special committee established in the manner hereinafter described. The program and plan of study proposed by each graduate student will be approved by the chairman and by the Dean.

The effort is made to arouse in the mind of the student a feeling that graduate work is not a matter solely of attendance on classes and passing examinations on courses. He must see his work as a whole and in its relation to a department of learning, not as a set of isolated units. In the more intimate personal relations to the advisory committee, too, he finds values impossible in the undergraduate course. He is a member of a small group; instruction is more nearly personal; he becomes acquainted with the method as well as with the content of learning.

THE GRADUATE DEGREES

The degrees under the supervision of the graduate faculty are Master of Arts (A.M.), Master of Science (S.M.), and Doctor of Philosophy (Ph.D.).

1. THE DEGREE OF MASTER OF ARTS

Prerequisites

For the degree of Master of Arts the general prerequisite is the completion of a course leading to the degree of Bachelor of Arts or, occasionally, the degree of Bachelor of Science in a college or university of standard grade. This course should have included special study in the department in which the graduate degree is sought sufficient in extent to constitute, in the judgment of the department, a proper preparation for the advanced work expected of candidates for the degree. If the undergraduate preparation has been insufficient, departments may prescribe certain preliminary courses before recommending a student for admission to candidacy for a higher degree. Such courses do not count for graduate credit, but become requirements for the degrees in addition to the nine courses specified below.

Registration

Nine full courses of advanced character are required for the master's degree. To complete these courses at least three full quarters of residence are required. No course will be counted for the degree unless it appears in this bulletin or is approved by the administrative board for inclusion in the next catalogue of the Graduate School. Such courses are of two classes only: those primarily for graduates, and those open to graduates and advanced undergraduates. Courses of this second class are ordinarily open only to students of at least senior standing.

Courses of Study

Of the nine courses offered by candidates for the degree of Master of Arts, six shall constitute the major and three the minor. During the first quarter of residence, these courses will be selected by the heads of departments or by the chairmen of departmental committees on graduate studies. Thereafter the selections shall be made by the student's special advisory committee. These committees, consisting of three professors of the graduate faculty, shall be appointed by the Dean not later than the second quarter of residence. All course selections and study plans are subject to the approval of the administrative board. All courses, both major and minor, may be drawn from a single department. When drawn from separate departments,

six courses (the major) are to be selected from one department, and three (the minor) from one other. Ordinarily, major and minor courses should be selected from the same division (cf. p. 19). The decision as to choice of courses is determined by what appear to be the interests of the student. Departments and committees, however, will be expected to provide the student with a program of studies having a clearly defined relationship.

Other Requirements

The method of securing admission to candidacy for the degree and the relation of the candidate to his advisory committee are explained under the headings of Admission and of General Regulations.

A reading knowledge of at least one modern foreign language is required of candidates for the master's degree. This knowledge will be tested by a special examination given by the language department concerned, and must be certified to before the student is admitted to candidacy for the degree. (See page 33.)

The Master's Thesis

Besides the completion of advanced courses that constitute a unified plan of study, the fitness of the student for the degree is tested in two ways: by a thesis and by oral and written final examinations. The thesis tests the candidate's knowledge of the method of investigation and his ability to make use of the knowledge he has acquired. The examinations test his knowledge of his special field by directing attention to the field as a whole, as contrasted with the course, which deals with a limited portion of the field.

The subject chosen for the thesis must be approved by the advisory committee and reported to the administrative board by the beginning of the second quarter of residence. No change in subject, or deferring of the time of approval, will be permitted unless at least two quarters of residence intervene between the approval of the subject and the conferring of the degree, except that, with the permission of the administrative board, the thesis may be completed by a student not in residence who has satisfied the requirements as to courses. For a statement of the conditions under which such permission may be secured, see the General Regulations.

The subject of the thesis must be connected with the major, must be connected with a course or courses pursued in residence, and may count not to exceed one course. In case the courses offered by the candidate include a seminar, the purpose of which is to give aid in the preparation of the thesis, no credit will be given for the thesis *per se*. The thesis, in order to be approved, must be written in correct English and in scholarly form. It must show independent thought both in its recognition of a clearly defined problem and in its method of treatment. It must show the sources

of information and a knowledge of the bibliography of the special field.

The thesis must be presented at least one month before the commencement at which the degree is to be conferred, and in triplicate. All copies must be on paper of prescribed size and quality, and must observe the special rules of form established by the administrative board. A copy of the regulations for the form of theses and abstracts may be had on application to the Dean's office. An abstract must be submitted with the thesis; if the thesis is approved and the degree conferred, this abstract will be printed in a special bulletin of the Graduate School annually devoted to reports of research.

Examinations

Candidates for the master's degree are required to pass all examinations in courses at the end of each quarter of residence with the grades specified under the general regulations given above. In addition, two special examinations are required. The first of these, a written examination on the field of the major, is to be set by the student's advisory committee and must be taken not earlier than the first month of the last quarter of residence. The second examination is oral, covering the entire work of the candidate, both major and minor, with special stress on the thesis and one other topic to be selected by the candidate. The examination is to be conducted by a special committee appointed by the Dean, consisting as a rule of the student's adviser as chairman and at least two other representatives of the major and minor subjects. Formal notice of the time and place for holding this oral examination shall be sent to all officers of professorial rank in the major and minor departments and to the members of the administrative board, and persons so notified may attend the examinations if they so desire.

These examinations must satisfy the committee which has charge of them that the candidate possesses such knowledge of his major and minor field as may reasonably be expected, that he can draw upon his knowledge with promptness and accuracy, and that his thinking is not limited to the separate units represented by his courses. Ability to draw conclusions and to express ideas with clearness and precision is a necessary element. No mere memorizing of facts will serve.

The special committees on theses and on the examinations will report their recommendations to the Dean at least one week before the end of the last quarter of residence. If the candidate's record in these respects is satisfactory, and if he has complied with all of the requirements for the degree, the Dean will report to the faculty for approval and recommendation to the board of trustees.

Commencement

Degrees are conferred at the annual commencement exercises of the University in June and at the close of the summer quarter in August. But a candidate may complete his required work, including examination and submission and acceptance of the thesis, at the end of any quarter or term. A student must be registered in the University in the quarter in which he is to be awarded a degree. If his work has been completed before this time, this requirement may be met by filling out the registration blanks without registering for specific courses. Attendance at the commencement at which the degree is conferred is required unless the candidate is specially excused by the Dean and the President of the University.

Summary of the Province of the Degree of Master of Arts

The rules and conditions governing the degree of Master of Arts set forth in the preceding paragraphs have certain well defined aims. The degree is not a research degree in the sense that the candidate is required in the thesis to make an original contribution to knowledge, although such contributions in the thesis are regarded as the proper fruition of graduate endeavor. It is, however, a research degree so far as the individual student is concerned, since he is engaged in a more technical study of a single field of learning than was possible during his undergraduate course, and this study culminates in work upon a single problem, the subject of his thesis, in the solution of which he is required to give evidence of the mastery of graduate method of investigation. He is concerned with the materials of learning, and with the organization and interpretation of these materials. Since the training is thought of as liberal, as great a latitude is permitted in the selection of courses as is compatible with the idea of a sharply defined field of major interest and with the requirement of interrelationship in the whole plan of study. The object is to make possible for the student a relative mastery of one of the liberal arts and to give him an introduction to critical scholarship and research method. A beginning is made in the training of the specialist. Hence the correlation of courses, the oral and written examinations, and the thesis. Since there are many possible combinations of courses, the method of administration provides for personal supervision of a student's work by a special committee.

Development of precision and method in investigation and the cultivation of powers of criticism and evaluation of evidence, together with the enlarged mastery of the subject matter of a defined field, constitute a training of indisputable value to the students who plan to enter the so-called learned professions or business or industry. Research is the way of progress in each activity.

The work outlined above can be done in one year by students whose preparation has been good and by those who devote themselves with

as much application to this more specialized work as do members of any other professional school. But two years are better than one and will yield correspondingly greater results. Especially is this true for young men and women who desire to prepare for high school and college teaching but who, instead of wishing to become active investigators, desire to become thoroughly trained as scholars. Part of their time may be spent in a study of courses and programs, and of methods of instruction applicable to their special subjects. Two years of study of this sort, if put on the right foundation, will give rich results, and in some cases such a course may be more useful than the course which leads to the doctorate. The graduate office and the administrative board will gladly plan work for the degree of Master of Arts on a two-year basis, and persons who complete such a course with distinction will be specially recommended for teaching positions of the better grade.

Teaching fellows, assistants, and instructors, whose time is partly devoted to service to the University, will be expected to take more than one year to obtain the master's degree. Such students in the Graduate School will not be permitted to carry more than six courses in any one academic year.

2. THE DEGREE OF MASTER OF SCIENCE

Prerequisites and Admission to Candidacy

The degree of Master of Science is offered after the completion of prescribed courses of study in any one of the following departments: chemistry, engineering, commerce, and geology; by special arrangement in some other scientific departments. The prerequisites for the degree are a Bachelor of Science degree in the department of the major as offered at this institution, or equivalent courses. Before being admitted to candidacy the student must have completed the courses of study for the corresponding bachelor's degree as outlined in the general catalogue.

Course of Study

In general, the requirements in courses are identical with those of the Master of Arts degree: *i. e.*, of the nine courses required, six shall constitute the major and three the minor. The minor, however, must be in a separate department from the major. The thesis, which is required of all candidates for the degree of Master of Science, under certain conditions may be counted for one course credit. The following prescribed courses of study lead to the degree in the field indicated:

I. MASTER OF SCIENCE WITHOUT SPECIFICATION OF MAJOR FIELD.

Students holding the degree of B.S. from a standard college may proceed to the degree of S.M. by fulfilling the following requirements: six approved courses in some science (the major), three courses in an allied department (the minor).

II. MASTER OF SCIENCE IN CHEMISTRY.

Six approved courses from the Department of Chemistry, and three approved courses courses from a distinct but allied department.

III. MASTER OF SCIENCE IN COMMERCE.

Six approved courses from the Department of Commerce, and three approved courses from a distinct but allied department.

IV. MASTER OF SCIENCE IN GEOLOGY.

A major consisting of Geology 304, 305, 306, 307, 308, 309, and three approved courses from a distinct but allied department.

V. MASTER OF SCIENCE IN ENGINEERING.

In each case the major shall consist of six approved courses from the group listed under the major field, and the minor* of three approved courses from one or two allied departments, exclusive of the major, so distributed that if the minor falls within two departments, the division will be two courses in one and one in the other.

A. Master of Science in Chemical Engineering.
Approved majors: Chemical Engineering 291, 292, 293, 391, 392, 393, and additional approved courses in the Department of Chemistry.
Departments in which courses for the minor may be pursued when properly approved: Economics and Commerce; General, Civil, Electrical, and Mechanical Engineering; Geology; Mathematics; and Physics.

B. Master of Science in Civil Engineering.
Four fields of specialization are afforded.

1. Municipal and Sanitary Engineering.
Approved majors: Civil Engineering 260ab, 265abc, 280a, 290abc, 365abc.
Departments in which courses for the minor may be pursued when properly approved: Bacteriology; Chemistry; Economics and Commerce; General, Electrical, and Mechanical Engineering; Geology; History and Government; Psychology; Sociology; Zoölogy.
2. Highway Engineering.
Approved majors: Civil Engineering 275abc, 260abc, 360abc, General Engineering 236abc.
Departments in which courses for the minor may be pursued when properly approved: Chemistry; Economics and Commerce; General, Chemical, and Mechanical Engineering; Geology; History and Government; Sociology; Rural Social-Economics.
3. Structural Engineering.
Approved majors: Civil Engineering 270abc, 275abc, 370abc; General Engineering 236abc, 256abc.
Departments in which courses for the minor may be pursued when properly approved: Chemistry; Economics and Commerce; General, Chemical, Electrical, and Mechanical Engineering; Geology; Mathematics; Physics.
4. Hydro-electric Engineering.
Approved majors: Civil Engineering 280a, 285ab, 275abc, 365abc; Electrical Engineering 262a, 272a, 282a, 382abc.
Departments in which courses for the minor may be pursued when properly approved: Chemistry; Economics and Commerce; General, Chemical, Electrical, and Mechanical Engineering; Geology; History and Government.

* It is understood that the minors chosen shall form part of a unified program and that students shall enter only such courses as they are qualified to pursue for graduate credit.

C. Master of Science in Electrical Engineering.
Approved majors: Electrical Engineering 262a, 272a, 282a, 382abc.
Departments in which courses for the minor may be pursued when properly approved: Chemistry; Economics and Commerce; General, Chemical, Civil, and Mechanical Engineering; Mathematics; Physics.

D. Master of Science in Mechanical Engineering.
Approved majors: Mechanical Engineering 283abc, 288abc, 166a, 176ab, 186ab; General Engineering 256abc.
Departments in which courses for the minor may be pursued when properly approved: Chemistry; Economics and Commerce; General, Chemical, Civil, and Electrical Engineering; Mathematics; Physics.

Other Requirements

The requirements regarding reading knowledge of a modern language, thesis, examinations, committees, residence, and conferring of degrees are the same as for the degree of Master of Arts, with the following exception: candidates for the degree of Master of Science in the departments of Civil, Electrical, and Mechanical Engineering are not required to have a reading knowledge of a modern foreign language.

3. THE DEGREE OF DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy is conferred only upon those who have completed, with high distinction, a period of extended study and investigation in a single field of learning during which they have gained control of the materials in the chosen field, have mastered the method of advanced study, and have illustrated this method through a dissertation, the result of independent research, which adds to the sum of human knowledge or presents results that have enduring value. Neither the accumulation of facts, however great in amount, nor the completion of advanced courses, however numerous, can be substituted for this power of independent investigation and the proofs of its possession. While it is true that a well prepared student of good ability may secure the degree upon the completion of three years' study, it should be understood that this time requirement is wholly secondary to other considerations that will be explained in the following paragraphs. In some instances work done in other institutions may be counted toward the degree at the discretion of the committee in charge and the administrative board. (See page 20.) Under no circumstances will the degree be awarded until the student has been in residence at least three consecutive quarters within a period of twelve months.

Admission

The rules for admission to courses leading to the degree of Doctor of Philosophy, and for registration for courses in the first year of residence are the same as those stated above in the section on the degree of Master of Arts. (See page 26.)

Course of Study

At the time of admission the student should, with the advice of the head of the department or of the chairman of the departmental committee on graduate studies, elect a major field. As soon as a dissertation topic has been chosen and has been approved by the department, a special committee will be appointed, consisting of the professor under whom the dissertation is to be prepared as chairman and of four other members of the graduate faculty. This committee will prepare the tentative program of the student's study and will guide the research activity. Until the committee is appointed, selection of courses will be in the charge of heads of departments or chairmen of departmental committees on graduate study. The special committee must be appointed before or at the time of the preliminary oral examination. All course selections and study programs are subject to the approval of the Dean and the administrative board of the Graduate School. Committees and departments will be guided by the following principles: (1) there shall be a major in some well defined and recognized field, a mastery of which shall be the aim of the student and the requirement of the Graduate School. As the student will be held responsible for the whole field, he will be required to take as many courses as may be required by the department concerned and the administrative board. (2) There shall be a minor, designated as such, consisting of six courses. These courses may be drawn from an allied department or from the department of the major. The latter program may be permitted only when the department offers recognized divisions of study other than those included in the accepted major in that department.

The work of the third year, or of such additional years as may be necessary, is primarily concerned with the writing of the dissertation or with special laboratory or research work. The department of the major or the student's special committee, however, may exercise the discretionary power of requiring that additional or supplementary courses be taken.

Foreign Language Requirements

Each candidate must pass examinations in French and German given under the supervision of the foreign language departments. These examinations will include one general elementary passage of French and of German, and at least two other passages in each language chosen from the field of specialization. The foreign language departments will set three dates each year, one about November 15, one about March 15, and one about July 20, for these examinations. The examination in one of these languages must have been passed prior to admission to candidacy.

The Dissertation

The subject chosen for the dissertation must have been approved by the special committee at the time of the preliminary oral examination. This topic must be approved by the administrative board before the student is admitted to candidacy for the degree. But work upon the dissertation, such as preliminary bibliographies and the collection of material, should be begun earlier than this. The dissertation is the fruit of thorough investigation of a definite problem and finds its value in the scholarly and workmanlike manner in which it is presented, in its contribution to learning, and in the mental power which it displays.

The dissertation must be presented, in four typewritten copies, at least six weeks before the commencement at which the candidate expects his degree. It must comply with the rules for form of thesis prescribed by the administrative board, and abstracts must be supplied as under the rules for the master's thesis. The special committee, and such other professors as may be appointed by the Dean, shall examine the dissertation, and no dissertation shall be accepted unless it secures the unanimous vote of this committee.

Publication of the dissertation, except by abstract in the graduate bulletin, is not required by the Graduate School. The various journals published by the University afford opportunity for publication, at least in part, and such publication is expected.

Examinations

Not earlier than the end of the second year, and at least one academic year prior to the commencement at which the degree is expected, a preliminary oral examination shall be given by the special advisory committee in charge of the candidate's work and by all members of the staff of the major and minor departments. This examination shall cover all the work of the two years. No student will be admitted to candidacy for the doctorate until this examination has been passed.

At least four weeks before the end of the period of study a written examination must be passed by the candidate. The field to be covered by this examination shall be determined by the student's special committee.

The final oral examination must take place at least one week before the commencement at which the student is a candidate for the degree. In case the department so desires, the student may undertake the oral in the major and the minor subjects separately. In no case, however, may a greater time than three months elapse between the two examinations. The committee to have charge of this examination is appointed by the Dean and includes the head of the major department with other members of the major and minor departments as assistants. The date and place of the examination

shall be publicly announced, and the examination shall be open to any member of the graduate faculty.

Candidates whose record in courses, examinations, and dissertation is satisfactory will be reported by the Dean to the faculty for recommendation to the board of trustees.

Commencement

Attendance at the commencement at which the degree is conferred is required, unless the candidate is excused by the Dean and the President of the University.

SUMMARY OF THE REQUIREMENTS FOR HIGHER DEGREES

Master's Degree

1. A bachelor's degree from a recognized institution.
2. A minimum residence period of three quarters.
3. A reading knowledge of one modern foreign language.
4. Nine graduate courses, six of which must be in the department of the major.
5. A written examination in the field of the major.
6. An oral examination covering the entire field of study.
7. A thesis.

Doctor of Philosophy

1. Admission is the same as for the master's degree.
2. A minimum of three years of graduate study, at least one of which must be at the University of North Carolina.
3. A reading knowledge of French and German.
4. A major covering adequately the field of major interest and at least six courses in a minor, which may or may not be in a different department.
5. A preliminary oral examination.
6. A written examination in the field of major interest.
7. An oral examination covering the entire field of study.
8. A dissertation.

COURSES OF INSTRUCTION

Only those members of the various departmental staffs who are concerned in graduate instruction are included in the following statements.

Notes on the Method of Numbering and Counting Courses

A *course* meets five or six times a week; a *half-course* meets three times a week. Two hours of laboratory or field work count as one meeting. All work is credited toward degrees, either as whole or as half-courses in accordance with the principles stated above.

Courses with a double number are completed in two quarters, and in general credit will not be given until both quarters have been completed.

Courses with three numbers require three quarters to complete, and in general credit will not be given for the work of one or two quarters only.

The letters *a*, *b*, and *c* refer to the quarter in which a course is offered, as *fall*, *winter*, and *spring*, respectively.

Courses numbered from 101 to 200 are for advanced undergraduates and graduates, from 201 to 400 for graduates only. Courses numbered 301 to 400 are research courses.

With this issue of the catalogue the new course numbers are given, followed in parentheses by the old numbers. In case of courses not listed last year no old numbers are shown, and similarly in case the number is the same as it has been.

DEPARTMENT OF BOTANY

William Chambers Coker, Kenan Professor.

Henry Roland Totten, Professor.

John Nathaniel Couch, Associate Professor.

For students well prepared in botany, opportunities are open in teaching, in the scientific work of the United States government and of state institutions, in special work in various phases of the subject such as plant breeding, and with independent institutions. A master's degree in botany should prepare the student for positions in any of these fields. A doctor's degree is open to those who have the opportunity to prepare themselves for the more responsible positions. One teaching fellowship of $500 and two assistantships are open to students prepared to fill them.

Laboratory Equipment

The botanical department has recently moved into a new, well equipped, fireproof building which was added as an extension to the

older building previously occupied by both the zoölogical and botanical departments.

The laboratory facilities are fully up to the standard of similar institutions, and funds are available for the purchase of any additional laboratory apparatus needed by research students in special subjects. Included in the equipment is a greenhouse, 15 feet wide by 80 feet long, which is a great aid in the production of plants for class use and for special research.

The department is prepared to guide students in research, particularly along the following lines: taxonomy and morphology of the lower plants, excluding bacteria; morphology and cytology of any group of plants except bacteria; and the constitution and distribution of the flora of North Carolina.

The library of the department has in the last few years been greatly augmented along the lines of standard classical works of prime importance in research, particularly in the field of mycology. In this field the department library is more complete than that of any other southern institution. Particular attention has also been given to American publications in botany of historical importance. It contains a majority of the important botanical journals, as well as thousands of valuable books and reprints. The Arboretum is of much value to students in the study of special problems, and the surrounding country is particularly rich in a great variety of interesting plant life.

The candidate for the master's degree is at first given work requiring individual initiative, and a part of his work during the course consists of original work, with the preparation of his results in the form of a thesis. Reading knowledge of French or German is required.

Candidates for the degree of Doctor of Philosophy give most of of their attention to the preparation of an advanced thesis, and must show ability to handle their subject in an original manner. A part of their work must be done during the summer at biological stations or other institutions, and visits to other libraries may be necessitated for the study of special literature.

Courses for Graduates and Advanced Undergraduates

103. STRUCTURE AND CLASSIFICATION OF THE ALGAE. Prerequisite, General Botany.

A study of the morphology and classification of the Algae. Lectures, reports, laboratory and field work. The subject may be continued under the same number for more than one quarter as the subject advances, credit being given for each repetition. *Two lectures or reports and six laboratory or field work hours a week, spring quarter. Laboratory fee, $4,00.* Professor Couch.

(This course is given in the Summer Session as s103 by Professors Totten and Couch.)

111, 112, 113 (4, 5, 6), s114. STRUCTURE AND DEVELOPMENT OF THE FUNGI. Prerequisite, General Botany.

A study of the morphology of the fungi, with special attention to plant diseases,

to the culture and development of the lower fungi, and to the identification of mushrooms. Lectures, reports, laboratory and field work. *Two lecture or report and six laboratory or field trip hours a week, fall, winter, and spring quarters. Laboratory fee, $4.00 a quarter.* Professors Coker, Couch.

122 (21). STRUCTURE, GROWTH, AND CLASSIFICATION OF THE LIVERWORTS. Prerequisite, General Botany.
Two lecture or report and six laboratory or field trip hours a week, winter quarter. Laboratory fee, $4.00. Professors Coker, Couch.

133 (22). STRUCTURE, GROWTH, AND CLASSIFICATION OF THE MOSSES. Prerequisite, General Botany.
Two lecture or report and six laboratory or field trip hours a week, spring quarter. Laboratory fee, $4.00. Professors Coker, Couch.

141 (23). STRUCTURE, GROWTH, AND CLASSIFICATION OF THE FERNS. Prerequisite, General Botany.
Two lecture or report and six laboratory or field trip hours a week, fall quarter. Laboratory fee, $4.00. Professor Coker and Miss Holland.

151, 153, s154. ADVANCED WORK IN THE STRUCTURE AND CLASSIFICATION OF SEED PLANTS. Prerequisite, General Botany and Botany 43 or Botany s43.
For each of these courses the student is required to collect, prepare herbarium specimens, and classify two plants each from twenty families of seed plants, with notes on the families and sketches to show the principal characters of one plant in each of these families. *One conference a week with the instructor, fall, spring, and the second term of the Summer Session. Laboratory fee, $4.00.* Professor Totten.

162 (8). STUDIES IN THE HISTORY OF BOTANY. Prerequisite, two courses in botany.
Readings and reports. This course may continue for more than one year as the subject advances, credit being given for each repetition. *Three hours a week, winter quarter.* Professor Coker.

Courses Primarily for Graduates

*211, 212, 213, s214. ADVANCED WORK IN THE HISTOLOGY, MORPHOLOGY, AND PHYSIOLOGY OF THE FUNGI.
The student is required to collect and prepare material for the microscopic study of special problems. Theses. These courses may be continued under the same numbers for more than one year as the subject advances, credit being given for each repetition. *Fall, winter, and spring quarters and the first term of the Summer Session. Laboratory fee, $4.00 a quarter.* Professors Coker, Couch.

*251, 252, 253, s254. MORPHOLOGY OF SEED PLANTS.
Advanced work in the embryology and anatomy of seed plants. The student is required to collect and prepare material for the microscopic study of special problems. Theses. These courses may be continued under the same numbers for more than one year as the subject advances, credit being given for each repetition. *Fall, winter, and spring quarters, and the second term of the Summer Session. Laboratory fee, $4.00 a quarter.* Professors Coker, Totten.

301, 302, 303 (110, 111, 112). GRADUATE RESEARCH.
Original work with thesis under the guidance of the instructor. These courses may cover most of the work of the student for several years, credit being given each quarter in accordance with the work done. *Laboratory fee, $4.00 a quarter.* Professor Coker.

* These two groups of courses represent the old numbers 107, 108, 109.

DEPARTMENT OF CHEMISTRY

James Munsie Bell, Alvin Sawyer Wheeler, Frank Kenneth Cameron, James Talmage Dobbins, Professors.

Floyd Harris Edmister, Horace Downs Crockford, Alfred McLaren White, Associate Professors.

Ralph Walton Bost, Assistant Professor.

The student who wishes to make chemistry his profession may later wish to enter one of the following branches of the profession: (1) *Teaching in schools, colleges, and universities.* At present the work leading to the degree of S.B. in Chemistry fulfills the requirements of the state, but there is a strong tendency towards the requirements of the master's degree for the highest grade of teachers' certificate. For teachers in colleges and universities the work leading to the Ph.D. degree should be taken. (2) *For industrial chemists, consulting chemists, and chemical experts,* at least the S.M. degree and preferably the Ph.D. should be sought. The courses leading to these degrees provide also thorough training in the allied sciences: physics, geology, mathematics, and engineering, thus enabling the student to become an expert adviser for a corporation in developing and supervising its manufacturing plants, or to act as a consulting chemist in special problems. (3) *The national and state scientific bureaus* employ large numbers of chemists and are continually appealing to the universities for nominations to fill new positions. The better of these positions require candidates with the Ph.D. degree. (4) *Research chemists* are employed by many private manufacturing establishments and by many semi-public research organizations which maintain well-equipped laboratories. In these, investigations are pursued that have for their end the improvement of old methods and the invention of new ones. The number of such laboratories is rapidly increasing, and there is now a great demand for highly trained chemists to take charge of these laboratories and to direct their work. The proper training for such a career is the work leading to the Ph.D. degree.

The work of a graduate student who specializes in chemistry consists in large measure in the solution of some research problem. The student learns at first hand the point of view and the methods of research chemists. At the present time a number of lines of investigation are being actively followed in this laboratory. In inorganic chemistry research is in progress on certain of the rare earths. Several problems in heterogeneous equilibria are being carried on by the divisions of Physical, Analytical, and Inorganic Chemistry. In physical chemistry the physical constants of the nitrotoluenes are being investigated at the request of the National Research Council. Oxidation-reduction studies and studies bearing on the theory of solutions are also being carried on by the Division

of Physical Chemistry. In organic chemistry cymene, a by-product of wood-pulp manufacture, is being investigated. Work is also progressing on juglone and on naphthazarine, two dye intermediates, on condensation reactions between diketones and semicarbazide and phenylsemicarbazide, and on extension of the Grignard Reaction. The reactions of the lead and tin organo-metallic compounds and the chemistry of the organic sulphur compounds are also under investigation. In industrial chemistry investigations are now under way concerning the utilization of sulphur dioxide in the recovery of merchantable phosphates, the hydro-metallurgy of copper, the production and utilization of cotton for cellulose, the removal of traces of iron from commercial grades of salt. In chemical engineering there is research on problems connected with the by-producting of coal of the Deep River coal field, on regenerated and converted cellulose, on the utilization of feldspar, and on several unit operation problems. In analytical chemistry a study of the separation of the anions and methods for quantitative determination for several elements is being carried on. The results of all these researches appear as the work proceeds, and during recent years numerous articles reporting progress in these investigations have been published in American journals.

The research experience gained in the graduate years is of inestimable value not only to the student himself but also to the educational institution or to the industry with which he later becomes associated. This is amply verified from the records of the positions held by the graduates of the University. Many have gone into the iron and steel industry; a number into the dye industry, either as supervisors of plant operation or as directors of chemical research. Others have gone into other industries, such as tobacco, corn products, general chemicals, and fertilizers. Several alumni are now in charge of large research projects at public and semi-public institutions.

The Department of Chemistry now occupies a new building named Venable Hall of Chemistry in honor of Doctor Francis P. Venable, who has been connected with the department for over fifty years. This building has about 55,000 square feet of floor space, mostly of modern factory construction, which with sky-light illumination is admirably adapted for laboratory use. The structure is fireproof, and contains a complete modern ventilating system. About thirty small individual research laboratories have been provided for the faculty and for graduate students. Each of these rooms is furnished with hot and cold water, live steam, gas, air under pressure, and electric current for experimental purposes. So far as possible the laboratory furniture is of fireproof construction, the laboratory table tops, hoods, and sinks being constructed of alberene stone or asbestos lumber. The library of the department occupies a large room in the main building and connects with a seminar room where small advanced classes are held.

The chemical library and reading room contain many complete sets of the most important chemical periodicals, many books of reference, and a unique collection of books of historical value and interest, amounting altogether to more than 5,000 volumes. An endowment of $5,000, the generous gift of Mildred Cameron Shepard in memory of her father, Paul Cameron, supplements the general fund for the maintenance of the library.

Fellowships and Scholarships

Ledoux Fellowship. This fellowship, awarded annually, is the gift of Dr. A. R. Ledoux of New York. The amount of the fellowship is $300.

Attention is also called to the teaching fellowships open to graduate students who wish to defray part of their expenses by teaching elementary classes.

Some assistantships are also open to graduate students. The duties of the assistants are the preparation for and supervision of laboratory classes in the larger elementary courses, and also the examination of laboratory reports.

Applications for these positions should be directed to the Department of Chemistry not later than March 15 of each year.

Graduate Degrees in Chemistry

The course leading to the degree of S.M. in Chemistry is open to students who have graduated with the degree of S.B. in Chemistry at the University, and to students who have completed the equivalent of the courses as prescribed by the University. The course leading to the degree of S.M. in Chemistry is prescribed by the graduate faculty and consists of a research in one of the branches, inorganic, organic, analytical, industrial, or physical chemistry; of two seminar courses of three quarters each in two of those branches; and of one course of three quarters to be selected from five departments: Physics, Geology, Electrical Engineering, Civil Engineering, and Mathematics. The general regulations of the Graduate School govern the work for the Ph.D. degree.

Candidates for the A.M. degree with a major in chemistry must have elected chemistry as a major in the junior and senior years. Prerequisites are Chemistry 31, 41, 42, 61, 62, and any three of the following: Chemistry 51, 71, 81, 82, 91, 92, 163. For candidates for advanced degrees with a major in some other department and with a minor in chemistry, the above courses only are open.

Courses for Graduates and Advanced Undergraduates

101 (18). HISTORY OF CHEMISTRY. Prerequisite, Chemistry 61, 62, 81, 82.

History of Chemistry, with discussion of the development of chemical theories. *Three hours a week, spring quarter.* Professor Cameron.

163 (63). IDENTIFICATION OF PURE ORGANIC COMPOUNDS Prerequisite, Chemistry 61, 62.
Lectures and laboratory. *Three lecture and six laboratory hours a week, fall quarter. Laboratory fee, $10.00.* Professor Bost.

164 (64). CHEMISTRY OF DYESTUFFS. Prerequisite, Chemistry 61, 62.
Lectures and laboratory. (Given in 1931-1932 and in alternate years.) *Three lecture and four laboratory hours a week, winter quarter. Laboratory fee, $10.00.* Professors Wheeler, Bost.

165 (65). ADVANCED TOPICS IN ORGANIC CHEMISTRY. Prerequisite, Chemistry 61, 62.
Lectures and laboratory. (Given in 1930-1931 and in alternate years.) *Three lectures and four laboratory hours a week, winter quarter. Laboratory fee, $10.00.* Professors Wheeler, Bost.

167, 168 (67, 68). ADVANCED ORGANIC PREPARATIONS. Prerequisite, Chemistry 61, 62.
Laboratory course. *Six laboratory hours a week, any two quarters. Laboratory fee, $10.00 a quarter.* Professors Wheeler, Bost.

169 (69). QUANTITATIVE ORGANIC ANALYSIS. Prerequisite, Chemistry 163.
Quantitative determination of carbon, hydrogen, nitrogen, halogens, sulphur, and a few other elements by well established methods. *Six laboratory hours a week, winter or spring quarter. Laboratory fee, $7.00.* Professors Wheeler, Bost.

183 (83). ADVANCED PHYSICAL CHEMISTRY. Prerequisite, Chemistry 81, 82.
Lectures and textbooks. *Five hours a week, fall quarter.* Professor Crockford.

184 (84). ELECTROCHEMISTRY. Prerequisite, Chemistry 81, 82.
Lectures and textbooks. *Five hours a week, winter quarter.* Professor Crockford.

185 (85). ELECTROCHEMISTRY. Prerequisite, Chemistry 184.
Laboratory course in Electrochemistry to follow the lecture course, Chemistry 184. *Six laboratory hours a week, spring quarter. Laboratory fee, $7.00.* Professor Crockford.

191, 192 (11, 12). CHEMICAL TECHNOLOGY. Prerequisite, Chemistry 61, 62, 91, 92.
The methods and economics of the chemical industries; lectures and laboratory work. *Three lecture and six laboratory hours a week, fall and winter quarters. Laboratory fee, $10.00 a quarter.* Professor Cameron, Mr. Hughes.

Ch. E. 191 (6). CHEMICAL ENGINEERING LABORATORY. Prerequisite, Chemical Engineering 194, 195, 196.
Efficiency studies on chemical equipment, plant erection studies, and unit process work in the laboratory. *Two lecture and six laboratory hours a week, spring quarter. Laboratory fee, $10.00.* Professor White.

Ch. E. 194, 195, 196 (3abc). PRINCIPLES OF CHEMICAL ENGINEERING. Prerequisite, Ch. E. 91, 94.
A study of the unit operations of chemical engineering, covering fluid flow, heat flow, filtration, evaporation, distillation, etc. *Three hours a week, fall, winter, and spring quarters.* Professor White.

Ch. E. 197 (7). CHEMICAL ENGINEERING CALCULATIONS.
A study of material and heat balances in industrial processes. *Five hours a week, fall quarter.* Professor White.

Courses Primarily for Graduates

241, 242, 243 (142abc). ADVANCED ANALYTICAL CHEMISTRY. Prerequisite, Chemistry 91, 92.
Seminar course: readings and discussions of recent advances in analytical chemistry. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor Dobbins.

251, 252, 253 (122abc). ADVANCED INORGANIC CHEMISTRY. Prerequisite, Chemistry 43.
Seminar course: readings, reports, and discussions of recent advances in inorganic chemistry. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor Edmister.

261, 262, 263 (162abc). ADVANCED ORGANIC CHEMISTRY. Prerequisite, Chemistry 163, 164.
Seminar course: readings and discussions of special chapters in organic chemistry. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professors Wheeler, Bost.

281, 282, 283 (182abc). ADVANCED PHYSICAL CHEMISTRY. Prerequisite, Chemistry 183, 184.
Seminar course: readings and discussions of recent advances in thermodynamics. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor Bell.

284, 285, 286 (183abc). ADVANCED PHYSICAL CHEMISTRY. Prerequisite, Chemistry 183, 184.
Seminar course: readings and discussions of recent advances in electrochemistry. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor Crockford.

287, 288, 289 (184abc). ADVANCED PHYSICAL CHEMISTRY. Prerequisite, Chemistry 183, 184.
Seminar course: readings and discussions of recent advances in heterogeneous equilibria, phase rule, film and colloid phenomena. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor Cameron.

Ch. E. 291, 292, 293, (112abc). ADVANCED TECHNICAL CHEMISTRY. Prerequisite Chemistry 191, 192.
Seminar course: readings and discussions of recent advances in technical chemistry. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor White.

341, 342, 343 (141abc). RESEARCH IN ANALYTICAL CHEMISTRY.
The statements made in regard to courses 391, 392, 393 apply also to this course. *One lecture and nine laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $10.00 a quarter.* Professor Dobbins.

351, 352, 353 (121abc). RESEARCH IN INORGANIC CHEMISTRY.
The statements made in regard to courses 391, 392, 393 apply also to this course. *One lecture and nine laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $10.00 a quarter.* Professor Edmister.

361, 362, 363 (161abc). RESEARCH IN ORGANIC CHEMISTRY.
The statements made in regard to courses 391, 392, 393 apply also to this course. *One lecture and nine laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $10.00 a quarter.* Professors Wheeler, Bost.

381, 382, 383 (181abc). RESEARCH IN PHYSICAL CHEMISTRY.
The statements made in regard to courses 391, 392, 393 apply also to this course. *One lecture and nine laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $10.00 a quarter.* Professors Bell, Cameron, Crockford.

Ch. E. 391, 392, 393 (111abc). RESEARCH IN INDUSTRIAL CHEMISTRY.
This course is intended for applicants for advanced degrees. Laboratory work with frequent conferences with the professor and reference to the literature relating to the subject of research. The subject of research must be assigned or approved by the professor. This course extends throughout the year. *One lecture and nine laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $10.00 a quarter.* Professor White.

DEPARTMENT OF CLASSICAL LANGUAGES AND LITERATURES

GEORGE HOWE, WILLIAM STANLY BERNARD, GUSTAVE ADOLPHUS HARRER, Professors.

SHIPP GILLESPIE SANDERS, JAMES PENROSE HARLAND, Associate Professors.

Graduate work in the Department of Classical Languages and Literatures is designed to meet the needs of three classes of students: (1) those who intend by intensive study and research to specialize in the classics; (2) those who are teachers or who are preparing to teach; (3) those who desire a knowledge of the classical civilizations for cultural purposes.

1. Intensive study and research are made possible through advanced lecture courses, seminars, a well-equipped library, and facilities for exchange of books with libraries of other large universities. Also for each language a fund is provided for the purchase of books for specialized advanced study. The department has its own seminar room in the central library, which is well equipped with standard editions; books of reference, such as Pauly-Wissowa, Daremberg-Saglio, Müller's *Handbuch, Corpus Inscriptionum Latinarium, Thesaurus Linguae Latinae, Oxyrhynchus Papyri* and numerous others; and complete sets of journals, including: *The Classical Journal, The Classical Weekly, Studies in Philology, Classical Philology, American Journal of Philology, American Journal of Archeology, Journal of Hellenic Studies, Journal of Roman Studies, The Classical Review, The Year's Work in Classical Studies, Hermes, Glotta, Philologische Wochenschrift, Jahresbericht der Klassischen Altertumswissenshaft, Philologus, Rheinisches Museum, Revue de Philologie, Notizie degli Scavi, Speculum, L'année Epigraphique, Supplementum Epigraphicum, The Classical Quarterly.*

2. In view of the constantly increasing demand for well-trained teachers in secondary schools, courses are offered designed in content and method to meet this demand. Such prospective teachers

should apply for the master's degree in Latin as their major subject. One course only in Greek, Greek 14 (Comparative Literature 14), is required for such students. This course needs no knowledge of the Greek language.

3. The department aims also to coöperate with the other language departments in the University in making available for culture and comparative work in literature the great literatures of the world. To this end there are offered courses in Greek and Latin literature which do not require ability to read either language in the original. Such courses are designed to place emphasis on aspects of the Greek and Latin genius, forms of literature created and perpetuated, and their permanent contribution to western civilization. Such courses may be elected as part of a major for the degree of Master of Arts in the Department of Comparative Literature; and as a minor, or part of a major, in other departments.

Requirements for Advanced Degrees

At present an advanced degree may be taken in either Greek or Latin, or in both, with one language as the major and the other as the minor field of study. Students majoring in either of the two languages will probably be required to take certain courses in the history of the literature of Greece and Rome, and may be required, if the department thinks necessary, to take work in ancient history.

Requirements for advanced degrees are stated in general on pages 26-30 of this catalogue. Exact prescription of courses can be determined only upon a knowledge of the needs of the individual applicant, but candidates for the Ph.D. in Latin who have not studied Greek will be required to take some elementary work in the Greek language.

The department regularly offers courses in the Summer School.

GREEK

Courses for Graduates and Advanced Undergraduates

112 (8). HOMER: ADVANCED COURSE. Prerequisite, Greek 12.
Rapid reading of the entire Odyssey with Homeric study. *Five hours a week, one quarter, on application.* Professor Harland or Professor Bernard.

153-154 (21-22). GREEK DRAMA: ADVANCED COURSE. Prerequisite, Greek 53.
An extended reading and study of the Greek drama, with lectures on the origin, history, and structure of the drama. *Five hours a week, two quarters, on application.* Professor Bernard.

158 (43). THE GREEK NEW TESTAMENT. Prerequisite, Greek 58.
The Acts of the Apostles: study of grammar and diction and comparison with English version; the Gospels, with selections from the Epistles; the principles of textual criticism, sources and history of the Greek text and the versions. *Five hours a week, one quarter, on application.* Professor Bernard.

171 (31). GREEK HISTORY. Prerequisite, Greek 71.
Selections from Thucydides will be read and the history of Athens and Sparta

will be reviewed with a view to explaining the underlying causes of the Peloponnesian War. *Five hours a week, winter quarter, on application.* Professor Harland.

Courses Primarily for Graduates

201-202-203. SYNTAX OF THE GREEK LANGUAGE FROM HOMER TO THE NEW TESTAMENT.
Facility in reading the literature in the Greek dialects, Ionic, Attic the *Κοινη*, and German is a requisite. *Five hours a week, one quarter, on application.* Professor Bernard.

301-302-303 (101abc). GREEK SEMINAR.
This course is devoted to the study in detail of particular authors or periods in Greek literature, the subject matter varying from year to year. It calls for wide reading in the Greek authors selected and in the critical literature concerning them, with oral and written reports. Lectures and conferences. Professors Bernard, Harland, Sanders.
(For additional courses see under Courses Requiring no Knowledge of the Greek or the Latin Languages, and under Comparative Literature, pages 47-49.)

LATIN

Courses for Graduates and Advanced Undergraduates

101 (12). ROMAN HISTORICAL LITERATURE. Prerequisite, Latin 1, 2, 11.
A study of the structure, purposes, and methods of the most significant works. Translation and reading in English from the literature, reports, lectures. The course alternates with course 102. (Not offered in 1931-1932.) *Five hours a week, fall quarter.* Professor Harrer.

102 (13). ROMAN DRAMATIC LITERATURE. Prerequisite, Latin 1, 2, 11.
A study of the development of Latin comedy and tragedy. Reading of selected plays. The course alternates with course 101. *Five hours a week, fall quarter.* Professor Harrer.

103 (19). PROSE WRITINGS OF THE REPUBLIC. Prerequisite, Latin 1, 2, 11.
An account of the development of prose literature from Cato to Cicero, with special studies of certain types and readings from the chief works. *Five hours a week, winter quarter.* Professor Sanders.

104 (20). CICERO: POLITICAL CAREER AND WORKS. Prerequisite, Latin 1, 2, 11.
A study of Cicero, as statesman and advocate. Selected letters, as well as a number of orations, will be read. *Five hours a week, spring quarter.* Professor Harrer.

110 (30). MEDIÆVAL LATIN. Prerequisite, Latin 1, 2, 11 or the equivalent.
The course is principally concerned with translating from the Latin works of leading authors of the Middle Ages, and with some study of the chief differences between Classical and Mediæval Latin. *Five hours a week, winter quarter.* Professor Harrer.

Courses Primarily for Graduates

201 (100). PROBLEMS OF RESEARCH.
The purpose of this course is to acquaint the student with the general field

of classical studies and with the opportunities and methods of research. Typical problems will be reviewed, the nature and value of evidence discussed, and papers on assigned topics prepared. *Five hours a week, fall quarter.* Professor Howe or Professor Harrer.

202 (104). LATIN EPIGRAPHY.
The aim of the course is to acquire facility in the deciphering and translating of inscriptions, to study in detail a selection of significant inscriptions and their values in the field of Roman studies. *Five hours a week, fall quarter.* Professor Harrer.

203 (105). LATIN PALEOGRAPHY.
The aim of the course is a study of the more important scripts, practice in decipherment, and the methods of textual criticism. *Five hours a week, one quarter, on application.* Professor Harrer.

301-302-303 (101-102-103). LATIN SEMINAR.
The course in each quarter is devoted to the study in detail of a particular author or period in Roman literature, the choice of subject being determined, as far as possible, by the needs of the group. Typical subjects of recent years have been: Catullus, Lucretius, Cicero, Vergil, Horace, The Elegists, Tacitus, Post-Augustan Prose, Post-Augustan Poetry, etc. *Five hours a week, fall, winter, and spring quarters.* Professors Howe and Harrer.

310. THESIS COURSE.
This course is conducted by conferences as arranged with individual students. *Every quarter.* Professors Howe and Harrer.
(For additional courses see below under Courses Requiring no Knowledge of the Greek or the Latin Language and Courses in Comparative Literature, pages 47-49.

Courses Requiring no Knowledge of the Greek or Latin Language

112 (52). THE POETRY OF OVID.
The reading in English of the complete works of Ovid; special critical studies in the *Metamorphoses.* The influence of Ovid on later writers. *Five hours a week, fall quarter.* Professor Howe.

113. THE GREEK EPIC.
Epic as a literary form; the Iliad and Odyssey; origins, the Mycenaean civilization, literary characteristics, comparison of the chief English translations, comparison with Norse, Latin, Italian, and English epic. *Five hours a week, winter quarter.* Professor Bernard.

155 (36). GREEK DRAMATIC LITERATURE.
A course designed to embrace the origin, development, technique, and content of Greek drama, with emphasis on tragedy. An interpretation of Greek life and thought as contributing to world progress. *Five hours a week, winter quarter.* Professor Bernard.

DEPARTMENT OF COMPARATIVE LITERATURE

GEORGE HOWE, chairman, and the graduate staff of the departments of Classical Languages, English, Romance Languages, and Germanic Languages.

Courses for Graduates and Advanced Undergraduates

111 (51). THE LATIN EPIC.
The history of the Latin Epic; detailed study of the *Æneid*. *Five hours a week, spring quarter*. Professor Howe.

112 (52). THE POETRY OF OVID.
The reading in English of the complete works of Ovid. Special critical studies in the *Metamorphoses*. The influence of Ovid on later writers. *Five hours a week, fall quarter*. Professor Howe.

113. THE GREEK EPIC.
Epic as a literary form; the *Iliad* and *Odyssey;* origins, Mycenaean civilization, literary characteristics, comparison of the chief English translations, comparison with Norse, Latin, Italian, and English epic. *Five hours a week, winter quarter*. Professor Bernard.

155 (36). GREEK DRAMATIC LITERATURE.
A course designed to embrace the origin, development, technique, and content of Greek drama, with emphasis on tragedy. An interpretation of Greek life and thought as contributing to world progress. *Five hours a week, winter quarter*. Professor Bernard.

121. LESSING AND SCHILLER AND THEIR CONTEMPORARIES IN ENGLISH TRANSLATION.
Their lives and works. Their philosophical, theological, social, and literary views, and their indebtedness to previous men of letters in different countries. The influence of these authors on German and foreign thinkers and writers. Lectures. Reports. *Five hours a week, winter quarter*, 1931. (Not given in 1932.) Professor Metzenthin.

123 (64). GOETHE IN ENGLISH TRANSLATION.
Study of the man, thinker, and poet in connection with the German and general European movements of thought and literature in his time. Lectures and reports. *Five hours a week, spring quarter, 1932*. (Not given in 1931.) Professor Brown.

103. CHAUCER. See English (Coffman).

105. MEDIEVAL ROMANCE IN ENGLISH. See English (Thrall).

125. MILTON. See English (Taylor).

151 (54). THE MIDDLE AGES. This course alternates with course 152.
A survey of medieval France, England, Germany, Spain, Italy, and Byzantium, from the point of view of civilization and especially of art and literature. (Given in 1931-1932 and in alternate years.) *Five hours a week, fall quarter*. Professor Holmes.

152 (57). THE RENAISSANCE. This course alternates with course 152.
An account of the establishment of modern European culture. Lectures on the history, science, fine arts, literary scholarship, and literature of the Renaissance in Italy, France, Germany, the Netherlands, and England. *Five hours a week, fall quarter*. Professors Holmes (Chairman), Adams, Lyons.

156 (56). DANTE IN ENGLISH TRANSLATION.
The *Vita Nuova* and the *Divine Comedy;* the precursors of Dante and the poets of the *dolce stil nuovo*. Special studies of Dante's political and social philosophy, with particular emphasis on Dante as a poet and as a guide. *Five hours a week, fall quarter*. Professor Huse.

157 (58). CERVANTES AND ENGLISH LITERATURE.
Consideration of the Romances of Chivalry in Spain; study of Cervantes, *Don Quixote* and the *Exemplary Novels* in English translation. *Five hours a week, spring quarter.* Professor Stoudemire.

159. FRENCH CLASSIC DRAMA.
A general survey of the origins of classicism in France. Assigned readings in the Greek and Latin dramatists with emphasis on the modification of their art which explains the masterpieces of the French 17th century. The greater part of the course will be given over to the plays of Corneille, Molière, Racine, and their contemporaries. The decline of classicism in France; the gradual breaking down of classic standards, and the evolution toward an unrestricted drama. *Five hours a week, spring quarter.* Professor——.

161 (68). COMPARATIVE DRAMA.
A general survey of the drama and the theatre from Aeschylus to Ibsen. Special attention is given to the function of the drama in representative plays of the leading European dramatists. *Five hours a week, winter quarter.* Professor Koch.

162 (71). THE MODERN DRAMA.
A study of representative plays of recent times, beginning with Ibsen. Special attention is given to the function of the drama in interpreting modern thought and changing social conditions. (Given in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Koch.

163 (78). LITERARY CRITICISM.
The principles which have animated classical, romantic, and realistic literature. *Five hours a week, spring quarter.* Professor ——.

185 (85). INTRODUCTION TO FOLKLORE.
A study of folk literature and its cultural significance; of the theories of origin of themes; of the various types, such as the ballad, legend, myth, tale, and proverb. Methods of gathering folklore are evaluated. *Five hours a week, winter quarter.* Professor Boggs.

190 (90). DIRECTED READING. Open only to those who receive permission from the chairman of the department. *Equivalent of three hours a week, fall, winter, and spring quarters.*

DEPARTMENT OF ECONOMICS AND COMMERCE

Dudley DeWitt Carroll, Claudius Temple Murchison, Erle E. Peacock, Erich W. Zimmerman, John Brooks Woosley, Professors.

Gustav T. Schwenning, Malcolm D. Taylor, Corydon P. Spruill, J. Merritt Lear, Milton S. Heath, Harry D. Wolf, Clarence Heer, Associate Professors.

Wirth F. Ferger, Assistant Professor.

Owing to the closely allied nature of their work, the departments of Economics and Commerce, formerly separate, have been merged. This arrangement reduces to a minimum duplication of effort and facilities. At the same time it emphasizes the essential unity of purpose always insisted upon by the two departments, namely, that

the commerce courses should arise from a groundwork of economic theory and should lead not only to explanations of characteristic business organization and practice, but also to an understanding of the relationships between business and economic life as a whole.

For convenience to the student, those courses in which the subject matter is treated mainly from a social point of view are grouped separately and classified under the heading, Division of Economics. Those courses tending to emphasize practice rather than principle are grouped in the commerce division.

The Economics division is designed to provide training which is in thorough accord with the commonly accepted ideal of a liberal arts education. At the same time, it aims at producing trained economists qualified to undertake the more responsible types of business or professional activity which require familiarity with the basic facts and problems of commerce and industry.

For graduate students, the Commerce division of the department offers a fairly high degree of specialization in various aspects of business. It recognizes that the business world is calling insistently for specialized experts, such as statisticians, research agents, field investigators, financial advisers, personnel managers, commercial agents, etc. The government, in connection with its industrial and fiscal operations, its regulation of business, and its consular service, also requires a large number of men who have an understanding of the highly complicated phases of trade and industry.

The student may pursue specialized work in any of the following study groups; factory organization and administration; banking and finance; marketing; advertising and salesmanship; merchandising; personnel management; risk-bearing and insurance; accountancy; foreign trade.

The department offers three graduate degrees: Master of Arts, Master of Science, and Doctor of Philosophy. Candidates for the degree of Master of Arts must have completed an undergraduate major, or its equivalent, in Economics, and at least six of their graduate courses must be in the division of Economics.

Candidates for the degree of Master of Science must hold the degree of B.S. in Commerce, or its equivalent, from this institution, or a like degree from another institution of approved standing. At least six of the graduate courses must be in the division of Commerce.

Candidates for the degree of Doctor of Philosophy must major in the division of Economics, but may satisfy the requirements of the minor in the Commerce division.

ECONOMICS

Courses for Graduates and Advanced Undergraduates

111 (47). ADVANCED COMMODITY ECONOMICS. **Prerequisite, Economics 11, 31-32.**

In this course the demand and supply conditions of a few commodities selected to represent types are studied. The institutional factors affecting these conditions are critically examined with particular reference to price behavior. (Alternates with Commerce 145 and will be given in 1932-1933.) *Five hours a week, spring quarter.* Professor Zimmerman.

121 (20). RISK AND RISK-BEARING. Prerequisite, Economics 31-32.
A study of the risk element in modern industry together with the measures which have been devised to meet it. This course should precede the study of insurance. *Five hours a week, fall quarter.* Professor Lear.

124 (24). PRINCIPLES OF MARKETING. Prerequisite, Economics 31-32.
This course sets forth the principles underlying general marketing practice. The assignments relate to marketing facilities and services (such as transportation, warehousing, grading, financing, assembling, and distributing), marketing agencies and organizations, organized exchanges and future trading, and certain problems of competition and price policy. *Five hours a week, winter quarter.* Professor Taylor.

141 (13). PUBLIC FINANCE. Prerequisite, Economics 31-32.
A general study of government business covering the principles involved in public revenues and expenditures—local, state, and national; a treatment of the just distribution of public charges and their incidence; and a study of the growth and organization of modern tax systems. *Five hours a week, fall quarter.* Professor Heer.

142 (14). PROBLEMS IN PUBLIC FINANCE. Prerequisite, Economics 141.
An advanced critical study of certain present problems in government finance. *Five hours a week, winter quarter.* Professor Heer.

144 (54). THEORIES AND FORMS OF BUSINESS ENTERPRISE. Prerequisite, Economics 31-32.
This course deals primarily with the combination movement. But it will treat this problem in its widest aspects: the historical background and the evolution of modern business forms, the theory of business enterprise, the structures and functions of organization, the relation of these questions to social welfare. Pools, trade associations, mergers, trusts, bankers' control, price control, are some of the principal questions which will be considered. *Five hours a week, winter quarter.* Professor Heath.

151 (15). TRANSPORTATION. Prerequisite, Economics 31-32.
A general study, from the historical and critical points of view, of railway transportation in such representative countries as Great Britain, France, Italy, Germany, and the United States; with some consideration of passenger and freight traffic and rates, and the State's relation to railways. *Five hours a week, fall quarter.* Professor Heath.

161 (26). INTERNATIONAL TRADE: THEORY AND POLICIES. Prerequisite, Economics 31-32.
In this course international trade is viewed from the standpoint of the political economist, emphasizing the social aspects. After an historical study of the past and a critical analysis of the present foreign commerce of the United States and principal commercial rivals, an effort is made to apply to a survey of our foreign markets and of our foreign sources of supply the general principles of economic theory in so far as they pertain to international trade. Following this the payment balances of this country and of other leading countries engaged in world commerce are critically studied. Finally, the most important theories of international trade are reviewed in the light of historical development. *Five hours a week, fall quarter.* Professor Zimmerman.

165 (27). COMMERCIAL POLICY OF MODERN NATIONS. Prerequisite, Economics 161.

After a general survey of international commercial policy up to the close of the Napoleonic Wars, a more detailed comparative study of the commercial policy of the leading nations during the last hundred years is made. The following countries are included: United States, Great Britain, France, Germany, Russia, Italy, Canada, Argentina, and India. Special attention is given to tariff problems, colonial policies, and to imperialism. The present world resources situation and its probable effect on future commercial policy are appraised. (Alternates with Commerce 169; will be given 1931-1932.) *Five hours a week, winter quarter.* Professor Zimmerman.

171. ADVANCED ECONOMIC STATISTICS. Prerequisite, Econ. 71 or its equivalent.

This course is designed to give the student the ability to use some of the more exact and more technical tools of statistical method than can be considered in the elementary course, such as curvilinear trends for time series, changing seasonal variation, and multiple correlation. Acquaintance with practical work and the current literature in statistics is sought through required reading and class reports on recent statistical studies. *Three lecture and four laboratory hours a week, spring quarter.* Professor Ferger.

182 (35.) TYPES OF BANKING. Prerequisite, Economics 81-82.

A comparative study of specialized types of banking institutions—their organization, methods, functions, and relationship to the financial organization of society in general. The course will include trust companies, investment banks, commercial paper houses, commercial discount companies, savings banks, and the various classes of agricultural credit banks. (Alternates with Commerce 182 and will be given in 1931-1932.) *Five hours a week, spring quarter.* Professor Murchison.

185 (12). BUSINESS CYCLES. Prerequisite, Economics 31-32 and 81.

A study of the alternating periods of depression and prosperity. The underlying causes of panics and crises. Fluctuations in prices, trade volume, and physical production. *Five hours a week, winter or spring quarter.* Professor Murchison.

191 (30). AN INTRODUCTION TO THE LABOR PROBLEM. Prerequisite, Economics 31-32.

To the extent that the competitive wage system fails (a) to provide for the laborer an adequate basis for a decent living and (b) to draw from him the services he ought to render to industry, there appears to be a "labor problem." The purpose of this course is to make an analytic survey of the modern labor problem in its major aspects, such as unemployment, low wages, industrial accidents and diseases, overstrain and superannuation, and the status of the worker in industrial society. Trade unionism and the labor movement and intervention by the State in behalf of the worker, social methods of coping with the problems of labor are also surveyed. *Five hours a week, fall or winter quarter.* Professor Wolf.

192 (31). LABOR AND SOCIAL CONTROL. Prerequisite, Economics 191.

An advanced course in social methods of coping with labor problems. These fall roughly into three classes (a) self-help on the part of the workers, which embraces trade unionism, labor political activity, and consumers' coöperation; (b) employers' policies, such as welfare work and paternalism, profit-sharing, and company unionism; and (c) intervention by public authority, as through labor legislation, conciliation and arbitration, and judicial limitation of private property rights. In so far as possible the various topics will be studied in terms of the southern labor situation. *Five hours a week, spring quarter.* Professor Wolf.

195 (40). THEORIES OF ECONOMIC REFORM. Prerequisite, Economics 31-32.

A critical analysis of the leading proposals for reform in the present economic system, including socialism, Bolshevism, single tax, and industrial democracy. *Five hours a week, fall or spring quarter.* Professor Carroll.

Courses for Graduates

251-252-253 (100abc). ADVANCED ECONOMIC THEORY. Prerequisite, Economics 31-32.

A survey of economic theory from the standpoint of the evolution of modern industrial society. The three courses will not only include a review of the works of the leading economic writers, but will also summarize the principal physical, psychic, and social factors that have shaped economic theory and economic institutions. *Five hours a week, fall, winter, and spring quarters.* Professor Heath.

271. ECONOMIC STATISTICS. Introductory Course for Graduate Students. Prerequisite, the completion of an economics major, or the equivalent of our B.S. in Commerce.

This course covers the same material as Economics 71, with the addition of a limited number of additional assignments covering certain phases more carefully and fully. *Three lecture and four laboratory hours a week, every quarter. Laboratory fee, $2.00.* Professor Ferger.

301abc (106abc). SEMINAR IN ECONOMICS. Prerequisites, Economics 31-32, 81-82.

A general introduction to methods of advanced study. Some phase of economic activity in harmony with the interests of the members of the seminar is selected for consideration. Methods of work and content receive equal emphasis. *Two hours a week, fall, winter, and spring quarters.* Professor Murchison (Chairman).

385 (112). ECONOMIC DYNAMICS.

This course focuses upon the changing nature of the modern economic organization. An effort is made to identify the more important of the dynamic elements, and to evaluate the significance of each in the general process of change. Attention is given to the readjustment processes and problems of particular industries, as well as to general trade, finance, and social well-being. Topics covered would include consumption, behavior, income distribution, capital accumulation, money and credit conditions, new developments in marketing, production, transportation. The method of study will be inductive. *Hours arranged, fall winter, and spring quarters.* Professor Murchison.

NOTE. Registration for this course must be approved by the professor in charge.

341 (114). RESEARCH COURSE IN PUBLIC FINANCE.

The changing form and distribution of wealth and income together with the expanding conceptions of governmental services make imperative a constant re-examination of fiscal problems. The scope of operations and the magnitude of revenues and expenditures emphasize the importance of administrative efficiency. Critical studies in this field are carried on under the supervision of the professor in charge. *Fall, winter, and spring quarters.* Professor Heer.

NOTE. Registration for this course must be approved by the professor in charge.

361 (126). INTERNATIONAL ECONOMIC RELATIONS.

An increasing share of the economic life of mankind is being lifted out of the sphere of local and national activities, and is being subjected to world-wide

influences. This tendency affects not only those business interests of ours directly engaged in foreign trade, but in general reacts upon our political position as a world power and materially influences our domestic and economic life.

The aim of this course is to provide graduate students interested in world economics the opportunity of pursuing advanced research along such lines as these: the movement of world prices; international commodity price control; the world food problem; the population question; advancing industrialization and future supply of raw materials; problems of international law affecting economic activities; foreign investments; commercial treaties; colonial policy, etc. *Hours arranged, fall, winter, and spring quarters.* Professor Zimmerman.

NOTE. Registration for this course must be approved by the professor in charge.

391 (130). HUMAN RELATIONS IN INDUSTRY.

This course is a seminar in selected topics in labor economics and aims to provide a limited number of graduate students an opportunity of doing critical and constructive work in this field. In view of the fact that there are grave problems connected with the adjustment of the workers to the new industrial and social order that is being developed in the South Atlantic States, the general topic "Labor Problems of the South" was selected for study in the winter quarter of 1928. The course will take this form again if a sufficient number of students are interested. *Fall, winter, or spring quarter, hours arranged.* Professor Wolf.

NOTE. Registration for this course must be approved by the professor in charge.

399 (141). SEMINAR.

Individual research in a special field under direction of a member of the department.

COMMERCE

Courses for Graduates and Advanced Undergraduates

121 (38). INSURANCE: LIFE.

A study of the principles and technique of life insurance, including disability, accident, and group insurance. Some attention will also be given to the investment operations of insurance companies. *Five hours a week, winter quarter.* Professor Lear.

122 (39). INSURANCE: FIRE, MARINE, BOND, AND TITLE.

In this course, an effort is made to consider as far as possible the wide range which the insurance function covers and the probable trend of its future development. The topics noted in the title of the course are studied and as many others as time will permit. *Five hours a week, spring quarter.* Professor Lear.

141 (50). TRAFFIC PROBLEMS. Prerequisite, Economics 151.

A study of current technical problems in the field of transportation and traffic management. (This course will be given only in case as many as five students register for it.) *Three hours a week, winter quarter.* Professor Heath.

145 (51). OCEAN SHIPPING. Prerequisite, Economics 31-32.

A study of the elements of water transportation, trade routes, ports and terminal facilities, vessel types, ship operation and management, ocean freight service and rates, marine insurance. The problem of our merchant marine and national policies affecting it are also discussed. (Alternates with Economics 111 and will be given in 1931-1932.) *Three hours a week, spring quarter.* Professor Zimmerman.

151 (11). PRINCIPLES OF INDUSTRIAL MANAGEMENT. Prerequisite, Economics 31-32, Commerce 51.

This course covers the problems involved in the construction, equipment, and administration of a manufacturing enterprise. The unit of study is the factory. The subject matter is treated under four heads: the underlying principles of production, the agencies of production, the control of production operations, and the establishment of production standards. *Five hours a week, winter quarter.* Professor Schwenning.

154 (16). INDUSTRIAL MANAGEMENT: THEORIES AND PRACTICES. Prerequisite, Economics 31-32, Commerce 51. Open only to selected seniors and graduate students.

A critical examination of the economic, social, and ethical aspects of modern business administration. Current theories of organization and management will be taken up and subjected to careful scientific analysis. Practices will be compared with theories. An attempt will be made to formulate the underlying principles upon which the administration of modern industrial enterprise rests. *Three hours a week, winter quarter.* Professor Schwenning.

155 (14). PERSONNEL MANAGEMENT. Prerequisite, Economics 31-32, Commerce 51.

A scientific study of the methods of hiring and handling personnel in the various lines of industry. The supply, selection, training, promotion, transfer, and discharge of employees; the computation and significance of labor turnover: housing, educational, and recreational facilities; the functions of a personnel department with reference to efficiency, and the maintenance of good will between employees and employers. *Five hours a week, spring quarter.* Professor Schwenning.

157. TIME AND MOTION STUDY. Prerequisite, Economics 31-32; Commerce 51-151, or Commerce 51-52-53E. Open only to seniors and graduate students.

A presentation of the elements of time and motion study as a phase of scientific management and as a device used by modern industrial establishments to measure the productive capacity of workers on specific jobs and to set production standards. The course will include a discussion of the following: fundamentals and development of time and motion study; equipment and qualifications of a time study man; collection and tabulation of data; organization of the time study department, etc. Students will be given practice in making time studies and in applying the results. (Alternates with Commerce 154 and will be given in 1931-1932.) *Three hours a week, winter quarter.* Professor Schwenning.

169 (46). FOREIGN TRADE PRACTICE. Prerequisite, or corequisite, Economics 124.

This course treats of foreign trade as a business profession and serves to prepare for entrance into the field; emphasis throughout is on practical problems.

Part I. The organization of foreign trade: export departments; middlemen and their functions; coöperation.

Part II. Methods: direct versus indirect exporting; export campaigns; sales policies.

Part III. Foreign market analysis.

Part IV. Paper work and technical procedure in exporting and importing, including foreign trade financing. *Five hours a week, winter quarter.* Professor Zimmerman.

172 (4). ACCOUNTING PRACTICE. Prerequisite, Commerce 71 and prerequisite or corequisite, Commerce 72.

A laboratory course. Bookkeeping systems and records for the various industries prevalent in North Carolina are studied and practice sets for each are prepared. A tentative list will include tobacco manufacturing, furniture manufacturing, cotton goods manufacturing, automobile sale agencies and garages,

banks in small cities, and municipalities. *Six hours a week, spring quarter. Laboratory fee, $3.00.* Professor Peacock.

173 (5). COST ACCOUNTING. Prerequisite, Commerce 71-72.
Lectures with laboratory work. Methods for collection of data relative to prime costs and a careful analysis of various methods of burden distribution. Application of principles will be made in the laboratory by means of budgets for cost accounting in different classes of enterprise. *Five hours a week, fall quarter. Laboratory fee, $3.00.* Professor Peacock.

175 (6). AUDITING. Prerequisite, Commerce 71-72.
Lectures and problems. Kinds of audits, system of accounts, methods of conducting audits, and problems in auditing. *Five hours a week, winter quarter. Laboratory fee, $3.00.* Professor Peacock.

177 (7). INCOME TAX PROCEDURE. Prerequisite, Commerce 71-72.
This course consists of a thorough study of both the federal and state income tax laws and the problems that arise in the making of the various returns. The preparation of the tax returns and claims for refund will be undertaken as laboratory exercises. *Five hours a week, winter quarter. Laboratory fee, $2.00.* Professor Sherrill.

178 (8). C. P. A. PROBLEMS. Prerequisite, Commerce 71-72.
This course deals with the questions and problems given by the different states and the American Institute in their C. P. A. examinations. Typical problems are solved, and solutions prepared by the leading accountants of the country are studied. (This course will be given only in case as many as five students register for it.) *Three hours a week, spring quarter.* Professor Peacock.

179 (9). GOVERNMENTAL ACCOUNTING. Prerequisite, Commerce 71-72.
Lectures and laboratory work. A study of budgeting accounting and its application to the various governmental units; the differences between fund accounting and commercial accounting; methods of collecting data recorded in books of original entry; and the preparation of financial statements. A survey will be made of systems for educational institutions, and for state, county, and city governments. Laboratory work will consist of practical problems. Field trips will be taken in order to study the system used by the State of North Carolina, the system prepared by the County Government Advisory Commission for counties, and other available systems. *Five hours a week, spring quarter. Laboratory fee, $2.50.* Professor Sherrill.

181 (31). BANKING PRACTICE AND FOREIGN EXCHANGE. Prerequisite, Economics 81-82.
Organization and management of a commercial bank. Duties and responsibilities of different departments. Bank accounting. Handling of credit instruments, checks, drafts, acceptances, bills of exchange. Critical examination of present methods and standards. The course will also include a study of international banking operations; the credit instruments used in financing trade between nations; the forces determining rates of exchange. (Alternates with Economics 182 and will not be given in 1931-1932.) *Five hours a week, spring quarter.* Professor Murchison.

191 (12). CORPORATION FINANCE. Prerequisite, Economics 31-32, Commerce 51 and 71.
A study of the principles and practice of corporate financing. Among the topics considered are: the methods of raising permanent capital, problems of current financing, the treatment of earnings, and financial problems incident to expansion and reorganization. Specific problems and reports are employed to illustrate and emphasize the principles involved. *Five hours a week, winter quarter.* Professor Woosley.

195 (36). INVESTMENTS. Prerequisite, Economics 31-32, Commerce 71-72, 191.
This course is essentially a laboratory study of corporate securities from the standpoint of the investor. Primary emphasis is placed upon the development of technique and standards of investment analysis. *Five hours a week, spring quarter.* Professor Woosley.

Courses Primarily for Graduates

301abc (106abc). SEMINAR IN COMMERCE.
A general introduction to methods of advanced study. Some phase of business activity in harmony with the interests of the members of the seminar is selected for consideration. Methods of work and content receive about equal emphasis. *Fall, winter, and spring quarters.* Professor Murchison (Chairman).

399 (141). SEMINAR.
Individual research in a special field under direction of a member of the department.

DEPARTMENT OF EDUCATION

MARCUS CICERO STEPHENS NOBLE, NATHAN WILSON WALKER, EDGAR WALLACE KNIGHT,* MARION REX TRABUE,† ESEK RAY MOSHER, ARTHUR MELVILLE JORDAN, WILLIAM JOHN MCKEE, GEORGE HOWARD, JR., Professors.

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It is the primary function of the Department of Education to train teachers and administrative officers for the public schools, normal schools, teachers' colleges, and departments of education in colleges. This training must include not only an intimate knowledge of subject matter and of methods of instruction, but actual practice and skill in the collection and interpretation of the facts necessary in the intelligent adaptation of sound educational theory to local needs and to the individual differences of pupils.

As a consequence, there are offered in this department three types of courses: (1) those which present the facts and theories upon which modern education is founded; (2) those which develop the skill and attitude necessary in the conduct of modern schools; (3) those which aid and stimulate the student in the discovery, interpretation, and improvement of school conditions.

The Department of Education is centralized in the Peabody Building, a gift from the George Peabody Fund, equipped with recitation rooms, offices, laboratories, and a reading and seminar room.

It has entered into active coöperation with the local school board by which the elementary and secondary units of the local school system are open for the use of faculty and students in the department.

* Absent on leave, winter and spring quarters, 1931.
† Absent on leave, spring quarter, 1931, through winter quarter, 1932.

In like manner the rural schools in Orange County are always available for observation and study by faculty and students. This arrangement includes the Orange County Training School for Negroes. Courses of both graduate and undergraduate grade are offered in the Summer School and through extension classes, thus making it possible for teachers in service to earn credits towards the A.B., the A.B. in Education, or the A.M. degree.

In general the Department of Education strives to interpret and to serve the needs of the public schools of the state in so far as its resources will permit.

Courses for Graduates and Advanced Undergraduates

101 (41). INTRODUCTORY COURSE IN SCHOOL ADMINISTRATION. This course will consider the most important problems of school administration, especially as these problems bear on the success of the teacher's work. Students without teaching experience, or teachers without a knowledge of administrative problems, should not register for the more specialized courses in the field of administration until after completing this course. Textbook, observations, and discussions. *Five hours a week, spring quarter.* Professor Trabue.

102 (42). THE ELEMENTARY SCHOOL PRINCIPAL AS ADMINISTRATOR. The personal qualifications, previous experience, duties, and opportunities of the school principal are studied during the early meetings of this course. The organization of the school program, of the instructional staff, and of the housekeeping staff are then considered in relation to their effects on pupil development. The direction and administration of various elements in the school receive maximum attention in class discussions of experiences, observations, assigned readings, and special reports. *Five hours a week, alternate winter and summer quarters.* Professor Trabue.

103 (43). ELEMENTS OF STATISTICAL METHODS. Prerequisite, Education 30 or Psychology 21-22. The first meetings in this course will consider various methods of collecting data for educational, psychological, social, and economic investigations. The interpretation of data by graphic and mathematical devices will be taught chiefly by examples. Numbering, tabulation, the calculation of averages and variabilities, the transmutation of measures, and correlations will be included. Readings, demonstrations, problems, reports, and critical discussion. *Five hours a week, winter quarter.* Professor Trabue.

105 (47). GUIDANCE AND ADMINISTRATION OF PUBLIC SCHOOL PUPILS. Prerequisite, four full courses in education, including one in administration, and two years of successful teaching experience. This course undertakes not only to acquaint the student with the extensive literature of scientific research in pupil personnel work, but also to develop through actual handling of individual records, reports, and materials as many as possible of the important skills required of the principal in the classification and promotion of pupils, in program making, in organization of pupil activities, in student government, in athletics, etc. *Five hours a week, on application.* Professor Trabue.

141 (26). PUBLIC SCHOOL EDUCATION IN THE SOUTH. This course gives an historical survey of public school education in the Southern States with especial attention to its development in organization, administration, and supervision since 1876. Present-day questions in rural education are

studied in the light of their historical development, and attention is given to the educational reorganization needed for the proper solution of the new rural life problems. Textbooks, lectures, investigations, and reports. *Five hours a week, fall or spring quarter.* Professor Knight.

142 (36). HISTORICAL FOUNDATIONS OF MODERN EDUCATION. This course traces the development of some of the more important educational problems of modern times as they have been affected by the social and political facts of history, by the contributions of the leading educational theorists, and by institutional practice. Textbooks, lectures, investigations, and reports. *Five hours a week, winter quarter.* Professor Knight.

143 (37). SOCIAL AND EDUCATIONAL HISTORY OF THE UNITED STATES. (History 168.)
The social and educational institutions and practices of the United States are traced through: (a) the period of transplanting of European institutions; (b) the period of modifications of institutional life to meet new conditions; and (c) the period of development of a social and an educational system of free common schools, high schools, and higher and technical education in harmony with the political and social ideals and institutions of America. Textbook, lectures, investigations, and reports. *Five hours a week, fall or spring quarter.* Professor Knight.

144 (31). RURAL EDUCATION.
A course planned to meet the needs of students preparing to become rural school teachers, principals, supervisors, and superintendents. It gives consideration to the organization, administration, and supervision of rural school education in the United States, with especial emphasis on the present conditions in the South. The county as the unit of administration and support, federal aid and a national program for rural educational work, and the application of the principles, agencies, and methods of supervision to the rural school will be studied. Textbooks, lectures, special investigations, and reports. *Five hours a week, winter quarter.* Professor Knight.

149 (29). HISTORY OF EDUCATION IN NORTH CAROLINA.
The purpose and development of education in North Carolina as seen in the work of public, private, charity, and church schools. A comparative study of public education in North Carolina and other selected typical states of the American Union. Lectures, discussions, and assigned readings. *Five hours a week, fall or spring quarter.* Professor Noble.

160 (60). CURRICULUM CONSTRUCTION.
The construction and organization of the elementary school curriculum when based upon human needs. Includes consideration of the teacher's function in curriculum construction, objectives of the school subjects, sources of curricular material and criteria for evaluating it, selection and organization of the pupil-activities through which the objectives may be attained. *Five hours a week, alternate spring quarters.* Professor Trabue.

162 (67). TEACHING PUPILS HOW TO STUDY. Prerequisite, three or more courses in education, successful experience as a teacher, and satisfactory evidence of ability to conduct systematic investigations of pupils' habits.
The physical and environmental factors that condition effective study, the necessity of preliminary preparation for study, techniques for discovering a pupil's present study habits in each subject-matter field, the evaluation and improvement of study habits and programs of study in each field, and techniques for the supervision of practice and growth in each type of study will be considered, practised, and learned in this course. Investigations, observations, special reports, readings, and discussions. *Five hours a week, on application.* Professor Trabue.

163 (48). EVALUATING CLASSROOM INSTRUCTION.
The general and specific objectives of instruction are agreed upon in the early meetings of this course. Criteria are then developed for evaluating the materials, techniques, activities, and outcomes of instruction. The latter part of the course consists in applying the criteria to actual classroom lessons in an attempt to develop skill in observing, evaluating, and improving instruction. *Five hours a week, alternate spring and summer quarters.* Professor Trabue.

164 (62). TESTS AND MEASUREMENTS IN ELEMENTARY EDUCATION. Prerequisite, Education 31 or Psychology 21-22.
Methods of measuring and improving the results of instruction in the elementary school will be given detailed consideration in this course. Students will be made acquainted with the most important tests and scales and will be given some experience in interpreting the results, both statistically and practically. *Five hours a week, fall quarter.* Professor Trabue.

173 (64). MENTAL MEASUREMENTS. Prerequisite, Education 31 or Psychology 21-22.
A study of mental tests, both individual and group. The origin of the tests will be first considered, followed by a comparative study of the various types of group and individual tests. There will be ample opportunity offered for the actual administration of the tests and the interpretation of the results. *Five hours a week, spring quarter.* Professor Jordan.

194 (56). MEASUREMENTS IN SECONDARY EDUCATION. Prerequisite, Education 31 or Psychology 21-22.
Standard tests for measuring the results of secondary school instruction will be examined and discussed. Special attention will be given to the results and needs in North Carolina high schools. Students will be expected to become fairly familiar with the tests and scales and to develop some skill in interpreting results. *Five hours a week, fall quarter.* Professor Trabue.

197 (55). SOCIAL POLICY AND EDUCATION.
Fundamental problems in the social and ethical theory of education. Lectures, prescribed readings, essays, and reports. This course deals with problems of social progress from the standpoint of education, attempts to define a social policy for education, and discusses the vital educational issues involved in that policy. *Five hours a week, winter quarter.* Professor Walker or Professor Mosher.

Courses Primarily for Graduates

271-272 (110abcd). PROBLEMS IN EDUCATIONAL PSYCHOLOGY. Prerequisite, Education 31 or Psychology 21-22, and preferably one other course in Educational Psychology.
A graduate course treating intensively of the fundamental facts of educational psychology. This course is designed for those who intend to major in educational psychology and for all those who wish a thorough grounding in the psychological principles of education. The first part of this double course (271) will deal with problems of conduct and individual differences; the second part (272) will deal with problems of learning. *Five hours a week, fall and winter quarters.* Professor Jordan.

299 (151). PRINCIPLES OF SECONDARY EDUCATION.
A systematic course for graduate students, intended primarily for those who have not had Education 99. This course will embrace a study of the American high school, its evolution, organization, administration, functions, and problems. It is designed primarily for high school principals and graduate students who are looking forward to high school principalships. Textbooks, lectures, readings, and reports. A term paper will be required of each student before credit for the course will be allowed. *Five hours a week, spring quarter.* Professor Walker.

303abc (103abc). PROBLEMS IN EDUCATIONAL ADMINISTRATION. Prerequisite, Education 101, or its equivalent, and one other course in educational administration.

A graduate course offering opportunity for intensive study and research on selected problems in the field of educational administration. The problems will be selected by the class each year, making it possible for the student to take this course more than once. *Three hours a week, fall, winter, and spring quarters.* Professor Trabue.

304abc (104abc). PROBLEMS IN EDUCATIONAL MEASUREMENTS. Prerequisite, Education 164 or 194.

Students who wish to specialize in educational measurements may take this course more than once if desired, since the problems considered will differ from year to year. *Three hours a week, fall, winter, and spring quarters.* Professor Trabue.

341abc (126abc). FOUNDATIONS OF EDUCATION IN THE SOUTH.

This is a research course in modern educational practices and institutions and is open only to those advanced students who have had Education 141, or Education 142, or the equivalent. Various educational agencies will be studied through investigations, reports, and conferences. *Three hours a week, fall, winter, and spring quarters.* Professor Knight.

375 (140). THESIS COURSE.

This is a course of strictly graduate grade in which there will be taken up such work as is necessary for each student in connection with the writing of his degree thesis. It is intended for those students whose graduate major is in education, but students whose thesis topics are closely related to education are invited to attend and to take part in the discussions. *Three hours a week.* Professors in the School of Education.

376 (141). SEMINAR COURSE.

A research course in a special field under the direction of a member of the department. Students may register and receive credit for one, two, or three quarters. *Three hours a week, fall, winter, and spring quarters.*

398-399 (101ab-101cd). PROBLEMS IN SECONDARY EDUCATION.

This double course is intended for advanced students and is primarily a course in investigation. To be admitted to it, a student must have pursued other courses in secondary education. Students who have not taken Education 99 may be admitted only with special permission of the instructor. At the beginning of the course each student is required to select some one problem for special investigation. A thesis will be required of each student. Throughout the two quarters regular class discussions will be held on present-day problems in secondary education and assigned readings will be required. *Five hours a week, fall and winter quarters.* Professors Walker, Mosher.

SCHOOL OF ENGINEERING

*GUSTAVE MAURICE BRAUNE, JOHN EMERY LEAR, †THOMAS FELIX HICKERSON, THORNDIKE SAVILLE, ELMER GEORGE HOEFER, HERMAN GLENN BAITY, ‡GEORGE FRANCIS BASON, Professors.

RALPH MCCOY TRIMBLE, NEIL PHILLIPS BAILEY, ALFRED MCLAREN WHITE, Associate Professors.

* Deceased.
† On leave, Kenan Foundation, winter and spring quarters, 1931.
‡ Resigned January 1, 1931.

The profession of engineering offers rich opportunities to men who have the power to apply their technical knowledge and experience to the best advantage. Graduate technical training based upon a broad scientific and cultural foundation becomes a valuable asset to those who would fill places of leadership in the profession and in the affairs of life.

The School offers courses leading to the degrees of Master of Science in Chemical, Civil, Electrical, and Mechanical Engineering. The requirements for these degrees are in general the same as for the degree of Master of Arts, and the prescribed courses may be found on pages 30-31. Admission to candidacy for these degrees presupposes the completion of the regular four-year curricula of the University leading to the degrees of Bachelor of Science in Chemical, Civil, Electrical, and Mechanical Engineering. In the case of students from other technical schools of recognized standing certain substitutions may be accepted in lieu of specific requirements for the bachelor's degree here. The master's degree may ordinarily be obtained in one year after the conferring of the bachelor's degree, but in cases where the preliminary training of the candidate has been insufficient, or where the candidate is a teaching fellow or assistant, a longer time may be required.

Instruction is given by means of lectures, recitations, and seminars in connection with appropriate work in laboratories, in drawing rooms, and in the field. The various laboratories of Phillips and Venable halls are well equipped for graduate use, and adequate facilities are provided for research in all of the divisions of engineering. Two special libraries, containing more than sixteen thousand volumes of well-selected textbooks and reference books together with bound volumes of all the leading American and foreign technical publications—generally in complete sets—are accessible to graduate students in the engineering buildings. These libraries are repositories for the publications of the Federal Government, the state, educational institutions, and engineering societies.

CHEMICAL ENGINEERING

The profession of chemical engineering is constantly becoming of greater importance. With the recent phenomenal growth of industry has come the realization on the part of employers of a definite need for men whose training combines chemistry with applied mathematics and physics. The problems involved in the expansion of modern manufacturing and in the development and production of new materials must be solved in a large measure by the chemical engineer. Industry has been quick to recognize the desirability of graduate study for chemical engineers, and a definite demand exists for men with advanced degrees. To meet this need, a curriculum leading to the degree of Master of Science in Chemical Engineering has been developed.

Venable Hall houses the chemical engineering laboratories. A large laboratory of approximately 1,500 square feet of floor area contains the larger apparatus. The equipment includes an Oliver filter, a small plate-and-frame filter press, centrifuges, a paint mill, a jaw-crusher, a ball mill, a Dopp kettle with a variety of agitators, and several smaller kettles, tanks, and pumps. The laboratory is fitted with a two-ton traveling crane. Adjacent are a dark room, transformer room, storage rooms, and four control laboratories. These latter contain equipment for gas, fuel, water, and lubricant analysis. Oxygen and peroxide bomb calorimeters, a Junker gas calorimeter, moisture oven, volatile-matter, ash, and ash-fusion point furnaces, flash and fire-point testers, etc., are included. A Wysor polishing machine, metallographic camera, microscopes, and furnaces are provided for work in metallography. In general, each graduate student is allotted a small private laboratory for his personal use. The library of Venable Hall is unusually rich in complete sets of bound periodicals, in addition to the usual reference works and texts.

CIVIL ENGINEERING

The following specialized programs of graduate study are offered, leading to the degree of Master of Science in Civil Engineering:

a. *Municipal and Sanitary Engineering.* With the rapid increase in the growth of cities in North Carolina and other southern states, has come a wide demand for engineers trained to plan and administer the various technical activities of the modern city; therefore, a fifth-year program has been especially designed as a preparation for the important duties of city manager and city engineer. The four undergraduate years are identical with those in the curriculum leading to the degree of S.B. in Civil Engineering. A thorough treatment is given to the fundamental principles underlying the design and operation of streets, city planning, water works, and sewerage systems, water and sewage treatment plants, garbage and refuse disposal, and drainage. Approved courses in commerce present the basic facts in business administration which are required of all engineering administrators.

b. *Highway Engineering.* North Carolina has assumed a position of leadership in road building among the states in the Union, and consequently there is a demand for engineers who are trained as specialists in highway construction. Opportunities for employment are open to men who have specialized in highway work with the Federal Government, the State Highway Commission, county highway commissions, various municipalities, and with contractors handling highway work. The closest coöperation exists between the State Highway Commission and the University, and students are brought into contact with the state highway organization. The four undergraduate years are identical with those in the course leading to the degree of S.B. in Civil Engineering. In his undergraduate

courses the student is given thorough fundamental training in highway and railway engineering, and the design of steel and reinforced concrete structures. Using these courses as a foundation, the student is required in his graduate study to specialize and to acquire a detailed knowledge of the problems of highway construction.

c. *Structural Engineering.* Structural engineering includes the design and construction of all kinds of buildings, bridges, and similar structures, as for example, such typical structures as the Empire State building, or the Hell Gate and Hudson River bridges, or the immense Panama Canal lock gates. The structural engineer is called upon as a specialist in almost all branches of engineering, because structures of wood, concrete, or steel are found in the construction of nearly every engineering undertaking. The four undergraduate years are identical with those of the course of study leading to the degree of S.B. in Civil Engineering. In the graduate year the student devotes himself to specialized and intensive courses and research in structural engineering.

d. *Hydro-Electric Engineering.* Problems incident to the rapid increase in the development of the great water powers of the South and the nation, with the accompanying complexities of generation, transmission, and distribution of electric energy, have created a wide demand for engineers especially trained in the field of hydro-electric engineering. This course is particularly designed to meet the needs of students intending to enter the service of the various power and public utility companies or public service commissions, and for engineers now in practice who desire to return for a year of specialized work or research in some of the problems confronting the hydro-electric industry. The four undergraduate years are identical with those in either civil, electrical, or mechanical engineering. In the graduate year, the student will pursue specialized courses and research work, and will visit and report on several of the leading hydro-electric and steam power plants of the state.

ELECTRICAL ENGINEERING

With the splendid facilities of the electrical engineering laboratories in Phillips Hall, the school is able to offer excellent advantages for advanced work in laboratory investigation and engineering design. The laboratories comprise a total of nearly seven thousand square feet of floor space divided into a large dynamo laboratory containing over fifty generators, motors, and transformers; a standardization laboratory equipped with a wide range of precision standards for both direct and alternating current measurements; a well-equipped photometric laboratory; a radio laboratory; and a special research laboratory equipped with a complete General Electric oscillograph outfit. All of these laboratories are supplied with direct and alternating current power by means of a plug and socket system of connections. The University Power Plant offers excellent additional

facilities for commercial testing and economic study of an advanced nature. The four undergraduate years are identical with those of the course leading to the degree of S.B. in Electrical Engineering. The graduate year is devoted to specialized work in courses, research, and design.

MECHANICAL ENGINEERING

In the regular four-year course in mechanical engineering the training given is designed for the broader professional field, that is, for the designing and directing positions in industry. In this training two distinct, though related, fields are emphasized—machine design and heat-power engineering. Opportunity for advanced study in both of these fields is offered to qualified graduates. In the senior year of the four-year course the student may elect the aeronautical or the power option. It is possible by a year of graduate work to complete the senior option not elected, in addition to pursuing other advanced courses. For the study of heat-power problems, the steam and gas laboratory is well equipped with modern heat engines, and the fuel and oil testing laboratory has excellent facilities for the study of fuels and lubricating oils.

GENERAL ENGINEERING

Course for Graduates and Advanced Undergraduates

G.E. 116a (100c). CONTRACTS AND SPECIFICATIONS.
A course covering the laws of contracts, a detailed study of methods of writing correct specifications, the matter of securing or submitting bids, and the subject of bid bonds. *Three lecture hours a week, spring quarter.* Value, 3 quarter-hours. Professor Saville.

Courses Primarily for Graduates

G.E. 236abc (106abc). ADVANCED ENGINEERING MATERIALS. Prerequisite, General Engineering 36abc, or the equivalent.
Composition and physical properties of materials used in engineering construction; specifications and inspection methods; investigation of special properties and uses of important materials; improved methods of testing and manufacture; development of new methods of specification. *Three lecture and six laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00 a quarter.* Value, 6 quarter-hours a quarter. Professor Trimble.

G.E. 256abc (105abc). ADVANCED STRENGTH OF MATERIALS. Prerequisite, General Engineering 56abc.
General theory of flexure, combined stresses, Lamés theory for thick hollow cylinders, flexure of curved beams; and other theoretical and empirical matter on the general subject of strength of materials that is not treated exhaustively in the undergraduate curriculum of most engineering schools. *Three lecture hours a week, fall, winter, and spring quarters.* Value, 9 quarter-hours. Professor Hickerson, Mr. Noe.

CHEMICAL ENGINEERING

Courses for Graduates and Advanced Undergraduates

Ch.E. 191 (6). CHEMICAL ENGINEERING LABORATORY. Prerequisite Ch.E. 194, 195; corequisite, Ch.E. 196.

Efficiency studies on chemical equipment, plant erection studies, and unit process work in the laboratory. *Two lecture and six laboratory hours a week, spring quarter. Laboratory fee, $10.00.* Value, 5 quarter-hours. Professor White.

Ch.E. 194-195-196 (3abc). PRINCIPLES OF CHEMICAL ENGINEERING. Prerequisite, Ch.E. 91, 94.

A study of the unit operations of chemical engineering, covering fluid flow, filtration, evaporation, distillation, etc. *Three hours a week, fall, winter, and spring quarters.* Value, 9 quarter-hours. Professor White.

Ch.E. 197 (7). CHEMICAL ENGINEERING CALCULATIONS.

A study of material and heat balances in industrial processes. *Five hours a week, fall quarter.* Value, 5 quarter-hours. Professor White.

Courses Primarily for Graduates

Ch. E. 291, 292, 293 (112abc). ADVANCED TECHNICAL CHEMISTRY. Prerequisite, Chemistry 191, 192.

Seminar course: readings and discussions of recent advances in technical chemistry. *One lecture and four library hours a week, fall, winter, and spring quarters.* Professor White.

Ch. E. 391, 392, 393 (111abc). RESEARCH IN INDUSTRIAL CHEMISTRY.

This course is intended for applicants for advanced degrees. Laboratory work with frequent conferences with the professor and reference to the literature relating to the subject of research. The subject of research must be assigned or approved by the professor. This course extends throughout the year. *One lecture and nine laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $10.00 a quarter.* Professor White.

CIVIL ENGINEERING

Courses for Graduates and Advanced Undergraduates

C.E. 160abc (44abc, 45abc). CITY PLANNING, HIGHWAY AND RAILWAY ENGINEERING. Prerequisite, Civil Engineering 60a, or equivalent experience.

The first quarter is devoted to a study of growth of cities, street plans, subdivisions, housing, recreational facilities, zoning, transportation terminals, traffic regulations. The second quarter is concerned with the study of location, construction, and maintenance of the various types of highways, characteristics of road materials, highway administration, legislation, organization, and financing. In the third quarter are considered the problems and economics of railroad location and road bed construction and such practical subjects as ballast, ties and tie-plates, rails, frogs and switches, fences and cattleguards, bridge and trestle floors, track signs, etc.

Parallel laboratory exercises consist of practical and specific problems in city planning, location of highways and railways, the physical and chemical testing of road materials, study of reports, and observation of projects under construction and completed. *Three lecture and three laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $4.00 a quarter.* Value 13½ quarter-hours. Professor Trimble.

C.E. 165abc (34abc, 35abc). HYDRAULIC AND SANITARY ENGINEERING. Prerequisite, Civil Engineering 65a.

The epidemiological background, principle, and practice of sanitation and public health engineering; the theory and fundamentals of design, construction,

and operation of water supply and sewerage systems, water purification and sewage treatment plants, as applied to municipalities and rural communities. Attention is given to studies of rain fall, stream flow, and storage as applied to water supply, water power, and waste disposal. Parallel laboratory exercises comprise problems in the layout and design of simple water supply and sewerage systems and water and sewage treatment works. Training is given in the operation of such utilities and the routine laboratory technique employed in their control. *Three lecture and three laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $4.00 a quarter.* Value, 13½ quarter-hours. Professors Saville, Baity.

C.E. 170abc (14abc, 15abc). STEEL STRUCTURES. Prerequisite, General Engineering 56abc and Civil Engineering 70a.

Theory of determinate structures, graphical and analytical determination of direct and secondary stresses occurring in engineering structures, such as roofs, bridges, buildings, dams, retaining walls, etc. Parallel design exercises comprise specific and complete problems in steel and timber structures, such as buildings, industrial plants, roof and bridge trusses and girders, retaining walls, and water towers. *Two lecture and three laboratory hours a week, fall and winter quarters, two lecture and six laboratory hours a week, spring quarter.* Value 12 quarter-hours. Professor Braune.

C.E. 175abc (24abc, 25abc). REINFORCED CONCRETE STRUCTURES. Prerequisite, General Engineering 56abc.

Development of the mathematical principles involved in the design of plain and reinforced concrete beams, slabs, columns, foundations, retaining walls, arches, and girders. Parallel laboratory exercises comprise specific and complete problems illustrating the use of these structural elements in the design of buildings, bridges, and other reinforced concrete structures. *Two lecture and three laboratory hours a week, fall, winter, and spring quarters.* Value, 10½ quarter-hours. Professor Hickerson.

Courses Primarily for Graduates

C.E. 260ab (135bc). REGIONAL AND CITY PLANNING. Prerequisite, Civil Engineering 160abc, 165abc, or equivalent.

Following an historical resume of the subject, there is presented by means of lectures and readings a detailed topical analysis of the broad principles governing modern practice. The legal aspects are first treated, followed by consideration of the effects of physical factors, such as topography, river or sea front, etc. Consideration of communication facilities includes street plan, traffic control, transportation and transit problems, and port and industrial development. Zoning, housing, recreation, public health, statistics, public safety, and methods of financing precede a final analysis of numerous city or regional plans in effect in different parts of the country. *Three hours a week, winter and spring quarters.* Value, 3 quarter-hours a quarter. Professors Saville, Trimble, and other members of the graduate faculty.

C.E. 265abc (130abc). ADVANCED SANITARY ENGINEERING. Prerequisite, Civil Engineering 65a, Civil Engineering 165abc, or their equivalent.

An advanced course in sanitary and public health engineering, including the design and operation of water supply and sewerage systems, water and sewage treatment plants, water rate studies, leakage surveys, financial management, stream sanitation, industrial waste disposal, rural sanitation, garbage disposal, drainage, malaria control, etc. Occasional lectures are given by practising engineers, public works and public health officials. *Three hours a week, fall, winter, and spring quarters.* Value, 9 quarter-hours. Professors Saville, Baity.

C.E. 270abc (114abc). ADVANCED STEEL STRUCTURES. Prerequisite, Civil Engineering 170abc and Civil Engineering 175abc.

Secondary stresses and statically indeterminate structures, including steel arches, cantilever, suspension and movable bridges. *Three hours a week, fall, winter, and spring quarters.* Value, 9 quarter-hours. Professors Braune, Hickerson.

C.E. 275abc (124abc). ADVANCED REINFORCED CONCRETE STRUCTURES. Prerequisite, Civil Engineering 170abc and Civil Engineering 175abc.

A study of the theory and design of multiple arch dams, domes, rigidly connected frames, unsymmetrical bridges, etc. *Three hours a week, fall, winter, and spring quarters.* Value, 9 quarter-hours. Professor Hickerson.

C.E. 280a (132a). HYDROLOGY. Prerequisite, Civil Engineering 165abc, or equivalent.

A detailed study of meteorology, rainfall, stream flow, storage, and other factors influencing hydrological investigations. The application of modern statistical methods to such problems is particularly stressed. *Three hours a week, fall quarter. Laboratory fee, $2.00.* Value, 3 quarter-hours. This course may be continued for additional credit. Professor Saville.

C.E. 285ab (134bc). WATER POWER ENGINEERING. Prerequisite, Civil Engineering 280a, or equivalent.

The investigation and design of water power developments, including preliminary hydrological studies, investigation of dam foundation, dam design, characteristics and selection of turbines, etc. A complete report will be prepared, including estimated cost of development, market for power, relation to other power systems, and financing. This course may be followed by Electrical Engineering 262a, 272a, 282a. *Three hours a week, winter and spring quarters. Laboratory fee, $2.00 a quarter.* Value, 6 quarter-hours. Professor Saville.

C.E. 290abc (133abc). SANITARY CHEMISTRY AND BIOLOGY FOR ENGINEERING STUDENTS. Prerequisite, Chemistry 1-2, Civil Engineering 165abc, or equivalent.

A course designed to give intensive training in the laboratory methods employed in sanitary engineering practice. The work includes microscopical examinations; physical, chemical, and bacteriological determinations on water, air, milk, sewage, and industrial wastes; the analysis of sand and gravel for filtration purposes; limnological studies of streams and reservoirs; stream pollution investigations; and the application of laboratory tests to the control of sanitary works. Class and laboratory exercises are supplemented by field work and plant inspections. *Four to twelve laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00 a quarter.* Value 6 to 18 quarter-hours. Professor Baity.

C.E. 360abc (145abc). HIGHWAY ENGINEERING RESEARCH AND DESIGN. Prerequisite, Civil Engineering 160abc, or equivalent.

Laboratory research problems in highway materials; investigation of problems in the scientific design and construction of modern road types; problems involving the development of equipment for use in investigation or specification of methods and materials. *Three lecture and six laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00 a quarter.* Value, 6 quarter-hours a quarter. Professor Trimble.

C.E. 365abc (131abc). RESEARCH IN HYDRAULIC AND SANITARY ENGINEERING. Prerequisite, Civil Engineering 165abc, or equivalent.

For graduate or special students desiring to conduct investigations in hydrology, water, or sewage treatment, or stream pollution. *Four to twelve laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00 a quarter.* Value, 6 to 18 quarter-hours. Professors Saville, Baity.

C.E. 370abc (125abc). RESEARCH IN STRUCTURAL ENGINEERING. Prerequisite, Civil Engineering 170abc, 175abc, or equivalent.

A course for graduate students desiring to engage in an intensive analytical or experimental investigation of structural engineering problems. *Three lecture and six laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00 a quarter.* Value, 6 quarter-hours a quarter. Professors Hickerson, Trimble.

ELECTRICAL ENGINEERING

Courses for Graduates and Advanced Undergraduates

E.E. 102a (85a). ELECTRIC CIRCUITS. Prerequisite, E.E. 62abc and Mathematics 24E, 25E, 26E.

A mathematical study of the fundamental phenomena in the electric, magnetic, dielectric, and thermal circuits, emphasizing the circuital relations common to all. Considerable attention will be devoted to the application of complex quantities to alternating-current circuits. *Three lecture hours a week, fall quarter.* Value, 3 quarter-hours. Professors *Bason, Bailey.

E.E. 112a (85b). ELECTRICAL MEASUREMENTS. Prerequisite, E. E. 102a.

Theory, calibration, and use of instruments for the measurement of current, potential difference, power, and energy; bridge methods of measuring resistance, inductance, and capacitance; instrument transformers; magnetic measurements; dielectric tests; cable testing. *Three lecture hours a week, winter quarter.* Value, 3 quarter-hours. Professors Bason, Bailey.

E.E. 122a (85c). COMMUNICATION ENGINEERING. Senior elective. Prerequisite, E.E. 102a.

A study of the fundamentals involved in the transmission of intelligence by telegraph, telephone, and radio; local and central office equipment for manual and machine switching systems; elements of telegraph and telephone transmission; laws of oscillatory circuits; radio transmission; study of the electron tube as detector, amplifier, and oscillator. *Three lecture hours a week, spring quarter.* Value, 3 quarter-hours. Professors Bason, Bailey.

E.E. 162 abc (64abc, 74abc). ALTERNATING-CURRENT MACHINERY AND POWER TRANSMISSION. Prerequisite, E.E. 62abc, Mathematics 24E, 25E, 26E.

A thorough study of the theory of the alternator, transformer, synchronous motor, synchronous converter, induction motor, and generator, and the various types of single-phase commutator motors, and the electrical principles involved in long distance power transmission. *Three lecture and six laboratory hours a week. Laboratory fee, $7.00 a quarter.* Value, 18 quarter-hours. Professors Bason, Lear.

E.E. 172abc (84abc). DYNAMO DESIGN. Prerequisite, E.E. 62abc.

Electrical, mechanical, and economic questions involved in the design of electrical machinery; the effect of the design constants on the proportions and operation of machines. Each student will be required to make complete calculations for a d.c. generator or motor, a transformer, and an alternator. *Two lecture and four laboratory hours a week, fall, winter, and spring quarters.* Valu 12 quarter-hours. Professor Lear.

Courses Primarily for Graduates

262a (164a). ELECTRIC TRANSIENTS.

The mathematical theory of the phenomena of the transient state met with in the operation of electric circuits and machines; training in the technique of the oscillograph by the taking of a large number of oscillograms of characteristic

transient phenomena. *Laboratory fee, $10.00.* Value, 3 quarter-hours. Professors Bason, Lear.

272a (164b). HYPERBOLIC FUNCTIONS APPLIED TO TRANSMISSION PROBLEMS.
Use of hyperbolic functions of complex variables in the calculation of long distance transmission systems. Power relations in long lines; design of artificial lines. Value, 3 quarter-hours. Professors Bason, Lear.

282a (164c). DESIGN OF TRANSMISSION SYSTEMS.
Economic principles involved in the preliminary layout; insulation and lightning protection; sag of conductors; mechanical design of poles and towers. Value, 3 quarter-hours. Professors Bason, Lear.

382abc (184abc). ELECTRICAL ENGINEERING RESEARCH AND DESIGN.
The solution of one or more definite problems in some particular field of electrical engineering. The work of this course will be outlined, as far as possible, to suit the needs of the individual student, and will consist of original investigations, designs, or the economic study of some existing electric power plant. Value, 27 quarter-hours. Professors Bason, Lear.

MECHANICAL ENGINEERING

Courses for Graduates and Advanced Undergraduates

M.E. 166a (96a). AERODYNAMICS. Prerequisite, General Engineering 26abc, Civil Engineering 65a, Mechanical Engineering 66a.
This course covers fluid mechanics, similitude, functions and characteristics of air foils, theory and calculation of airplane performance, stability, control, and maneuverability. Textbook: *Airplane Design* by Warner, *Applied Aerodynamics* by Barstow, and the reports of the National Advisory Committee for Aeronautics. *Five lecture and three laboratory hours a week, fall quarter. Laboratory fee, $5.00.* Value, 6½ quarter-hours. Professor Bailey.

M.E. 176ab (97bc). AIRPLANE DESIGN. Prerequisite, General Engineering 56a, Mechanical Engineering 166a.
This course includes the calculation of airplane loadings, materials of construction, stress analysis, Department of Commerce requirements, design methods, weight control, and structural tests. Textbook: *Airplane Stress Analysis* by Klemin, *Airplane Design* by Warner, and references in structural analysis texts and current periodicals. *Two lecture and three laboratory hours a week, winter and spring quarters.* Value, 7 quarter-hours. Professor Bailey.

M.E. 186ab (98bc). AIRPLANE ENGINES. Prerequisite, Mechanical Engineering 166a; corequisite, Mechanical Engineering 78abc.
A study of airplane engines and propellers, design principles, performance calculations, and altitude effects; characteristics of existing engines, accessories, and engine testing and construction. Textbook: *The Airplane Engine* by Marks, and references in engine design textbooks, current literature, and manufacturers' specifications. *Two lecture and three laboratory hours a week, winter and spring quarters. Laboratory fee, $5.00.* Value, 7 quarter-hours. Professor Bailey.

Courses Primarily for Graduates

M.E. 283abc (194abc). ADVANCED ENGINEERING THERMODYNAMICS. Prerequisite, Mechanical Engineering 78abc and 83a.
An advanced course in thermodynamics with application to the theory and design of heat-power apparatus, such as steam engines and turbines, internal

combustion engines, refrigerating machines, and heating and ventilating systems. Value, 3 courses. Professor Hoefer.

M.E. 288abc. ADVANCED MECHANICAL DESIGN. Prerequisite, Mechanical Engineering 88abc.
A mathematical and experimental study of the effects of motion and vibration on the design and performance of machines and structures. Value, 3 courses. Professor Bailey.

DEPARTMENT OF ENGLISH

George Raleigh Coffman, Frederick Henry Koch, John Manning Booker, George Coffin Taylor, William Flint Thrall, Professors.

Almonte Charles Howell, Gregory Lansing Paine, William Dougald MacMillan, III, Eston Everett Ericson, Arthur Palmer Hudson, Associate Professors.

Louis Booker Wright, Raymond William Adams, Richmond Pugh Bond, Assistant Professors.

The Department of English offers to graduate students work in the following fields: (1) research leading to advanced degrees, with training afforded by specialized courses in literature and language; (2) special study of the drama, including dramatic composition and training for work in community drama.

1. Intensive study and research are made effective through advanced lecture courses and the seminars, through the resources of a well-equipped library, and through the stimulus of association with men who are actively interested in research. The library is especially strong in the field of Old and Middle English, in the literature of the sixteenth and seventeenth centuries, and in dramatic literature. Besides its share of the annual library appropriation, the department has the income from the Armfield Fund, which is applied exclusively to the purchase of books for advanced study. Several special appropriations have been made in the last few years, and several important collections have been added. A recent gift has placed in the library a distinctive collection of incunabula.

2. In addition to the advanced courses, which afford opportunity for gaining that sound and accurate knowledge that is the first essential of good teaching, the attention of teachers of English and of those who are preparing for such work is directed toward the development of an effective method. Such students have an opportunity to observe the methods of teaching and administration employed in the large undergraduate courses in English.

Requirements for Advanced Degrees

Candidates for advanced degrees in the Department of English must have completed, before admission to candidacy, the undergrad-

uate major in English at the University of North Carolina, or its equivalent.

The courses elected by a candidate for the master's degree must include English 131, one course in Chaucer, one course in drama before 1800 (including Shakespeare), and two period courses. Students who elect to substitute a play for a thesis shall take, in addition to the above five courses, another course in English drama before 1800 in place of English 141. All the courses may be chosen from the Department of English; or a minor may be chosen from some other department in the Division of Languages and Literatures, or, in special cases, from a department in some other division. The plan of work as a whole must be closely unified, and no department may be chosen as a minor unless the candidate has previously completed, as an undergraduate, an amount of work in that department sufficient to constitute an undergraduate minor.

After the candidate for the degree of Doctor of Philosophy has completed two full years of graduate study, he is expected to devote his major attention to the field of his immediate interest and to independent work.

Courses for Graduates and Advanced Undergraduates

101 (81). OLD ENGLISH: INTRODUCTORY COURSE.
A study of Old English grammar and syntax. A considerable amount of Old English prose is read. *Five hours a week, fall quarter.* Professor Ericson.

103 (83). MIDDLE ENGLISH: CHAUCER.
Previous training in Old or Middle English, not a fixed prerequisite. The work of the course will consist chiefly of a reading and discussion of Chaucer's works, with some consideration of Chaucer's language. *Five hours a week, winter quarter.* Professor Coffman.

105 (85). MEDIEVAL ROMANCE IN ENGLISH.
A survey of medieval romance and romance materials in English literature, with particular attention to the Arthurian tradition. *Five hours a week, spring quarter.* Professor Thrall.

111 (40). ENGLISH LITERATURE OF THE RENAISSANCE.
A survey of the literature of the Elizabethan period, exclusive of the drama. *Five hours a week, fall quarter.* Professor Thrall.

112 (41). SPENSER.
A study of the works of Spenser as indicative of Renaissance thought. *Five hours a week, winter quarter.* Professor Thrall.

113 (43). ENGLISH DRAMA, 1500-1600.
Five hours a week, winter quarter. Professor Wright.

114 (44). ENGLISH DRAMA, 1600-1642.
Five hours a week, spring quarter. Professor Wright.

121 (47). ENGLISH LITERATURE, 1616-1700.
The non-dramatic literature of the period. *Five hours a week, spring quarter.* Professor Howell.

125 (45). MILTON.
The works of Milton are studied in the light of the life, times, and culture of the poet, with some consideration of the problems involved in such a study. *Five hours a week, fall quarter.* Professor Taylor.

131 (48). ENGLISH LITERATURE, 1700-1780.
The non-dramatic literature of the period. *Five hours a week, fall quarter.* Professors MacMillan, Bond.

133 (75). RESTORATION AND EIGHTEENTH-CENTURY DRAMA.
A study of the drama from 1660 to 1800. (Given in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor MacMillan.

141 (51). ENGLISH LITERATURE, 1780-1830.
A survey of English literature of the romantic period with especial attention to the greater poets. *Five hours a week, winter quarter.* Professor Hudson.

143 (55). VICTORIAN LITERATURE I, 1832-1860.
A survey with special attention to Carlyle, Tennyson, and Browning. *Five hours a week, winter quarter.* Professor Booker.

144 (56). VICTORIAN LITERATURE II, 1860-1890.
A survey with special attention to Ruskin, Rossetti, Morris, and Swinburne. *Five hours a week, spring quarter.* Professor Booker.

149 (69). NINETEENTH-CENTURY DRAMA.
A study of representative English plays in the nineteenth century. Particular attention is paid to the Celtic Renaissance. Consideration is given to the beginnings of a new folk drama in America. (Given in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor Koch.

151 (65). AMERICAN LITERATURE.
A survey of the literature of the colonial, revolutionary, and early national periods. *Five hours a week, fall quarter.* Professor Paine.

161 (68). COMPARATIVE DRAMA.
A general survey of the drama and the theatre from Æschylus to Ibsen. The development of dramatic literature is studied through representative plays (in translation) of the leading European dramatists. *Five hours a week, winter quarter.* Professor Koch. (The course is the same as Comparative Literature 161.)

162 (71). MODERN DRAMA.
A study of representative plays of recent times, beginning with Ibsen. Special attention is given to the function of the drama in interpreting modern thought and changing social conditions. (Given in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Koch. (The course is the same as Comparative Literature 162.)

163 (78). LITERARY CRITICISM.
The principles that have animated classical, romantic, and realistic literature. *Five hours a week, spring quarter.* Professor ————. (The course is the same as Comparative Literature 163.)

167. THE ENGLISH BALLAD.
A study of the English and Scottish popular ballads, with a survey of ballad survivals in America, particularly in North Carolina. Students in the course who may have access to ballads in oral circulation will be encouraged to collect them. *Five hours a week, spring quarter.* Professor Hudson.

170. THE HISTORY OF THE ENGLISH LANGUAGE.
The English language in the light of its historical development. Study of the chief linguistic influences and tendencies as seen in literary specimens of the various periods. *Five hours a week, spring quarter.* Professor Ericson.

Courses Primarily for Graduates

201 (101). STUDIES IN OLD ENGLISH LITERATURE: BEOWULF. Prerequisite, English 101.
Five hours a week, winter quarter. Professor Ericson.

202 (102). MIDDLE ENGLISH.
The main purpose of the course is to acquaint the student with the social, political, and religious background of medieval England. A fuller study will be made of the historical and philological relations of Middle English than in English 103. *Five hours a week, spring quarter.* Professor Coffman.

225 (125). PLAY WRITING, ADVANCED COURSE.
A practical course in play writing with a study of the development of dramatic theory. Emphasis is placed on the native tradition and present-day life with which the student is familiar. The Carolina Playmakers furnish a working laboratory in production for the plays written in the course. *Five hours a week, fall quarter.* Professor Koch.

226 (126). PLAY WRITING, ADVANCED COURSE.
The principles of dramatic construction and practice in writing one-act plays. *Five hours a week, winter quarter.* Professor Koch.

227 (127). PLAY WRITING, ADVANCED COURSE.
Practice in writing the full-length play with demonstrations of plays written in the course. *Five hours a week, spring quarter.* Professor Koch.

231-232 (46ab). SHAKESPEARE.
The works of Shakespeare are studied with emphasis upon the historical and critical problems which they present. *Five hours a week, winter and spring quarters.* Professor Taylor.

283 (64). THE ROMANTIC MOVEMENT IN AMERICAN LITERATURE.
(Given in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor Paine.

284 (63). AMERICAN LITERATURE, 1870-1900.
(Given in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Paine.

309 (210). SEMINAR: MEDIEVAL DRAMA.
A study of the origin and development of the religious drama in Western Europe; special consideration of the craft cycles and the moralities. *Five hours a week, fall quarter.* Professor Coffman.

310 (110). SEMINAR: STUDIES IN ELIZABETHAN LITERATURE.
Research in special problems in Elizabethan literature. *Five hours a week, fall quarter,* Professor Wright. *Winter quarter,* Professor Taylor.

312 (112). SEMINAR: STUDIES IN SEVENTEENTH-CENTURY LITERATURE.
Research in special problems in the literature and thought of the seventeenth century. (Given in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor Howell.

313 (113). SEMINAR: STUDIES IN EIGHTEENTH-CENTURY LITERATURE.
Special problems in the literary and intellectual movements of the eighteenth century. *Five hours a week, spring quarter.* Professors MacMillan, Bond.

317 (117). SEMINAR: STUDIES IN NINETEENTH-CENTURY ROMANTICISM IN ENGLAND.
Wordsworth and Coleridge: the English and Continental aspects of their thought and art. (Not given 1931-1932.) *Five hours a week, fall quarter.* Professor ————.

318 (118). SEMINAR: STUDIES IN NINETEENTH-CENTURY ROMANTICISM IN AMERICA.
(Not given in 1931-1932.) *Five hours a week, winter quarter.* Professor ——.

320 (120ab). SEMINAR: STUDIES IN VICTORIAN LITERATURE.
Special problems in the literature appearing between 1832 and 1890. *Five hours a week, fall quarter.* Professor Booker.

331 (131ab). SEMINAR: BIBLIOGRAPHY.
The principles and methods of the study of English with a series of simple problems in bibliography and literary history. Required of all candidates for the A.M. and Ph.D. degrees. *Five hours a week, winter quarter.* Professor Paine.

340 (140). SPECIAL READINGS.
Reading in a special field under the direction of a member of the department. This course may not be repeated for credit.

341 (141). SPECIAL RESEARCH.
Research in a special field under the direction of a member of the department.
Attention is called to the courses in philology and advanced literary study offered in the departments of Classics (Latin 110, Medieval Latin; Latin 202, Latin Epigraphy; Latin 203, Latin Paleography), Comparative Literature, Germanic Languages (German 221, Introduction to Comparative Philology; German 201, Gothic, etc.), and Romance Languages (French 221-222-223, Old French; French 225, Provençal; Celtic 205, Middle Irish; Spanish 221-222, Early Spanish; Italian 131-132, Dante; etc.).

DEPARTMENT OF GEOLOGY

Collier Cobb, William Frederick Prouty, Professors.

†Joel Howard Swartz, Associate Professor.

Gerald Raleigh MacCarthy, Assistant Professor.

To men entering the profession of geology opportunities for useful employment are open in teaching, in state and national bureaus and surveys, in mining, in investigating oil fields, in working various economic geologic deposits, and in soil investigation. Preparation for this work may be had through the regular college course, with geology as the major study throughout the course, and the addition of field work in vacation and work in the Graduate School for one or more years. It may also be obtained through a course in the School

† Absent on leave, 1930-1931.

of Applied Science leading to the degree of Bachelor of Science in Geology, and this should in every case be followed by work leading to the degree of Master of Science as outlined below.

The work of the graduate student specializing in geology should be, in large measure, the investigation of problems in the field, and the working out of many of the details in the laboratory. At the present time the following lines of investigation are being pursued by members of the Department of Geology: mineral analysis of seashore sands and their value as a source of economic minerals; shore-line processes in relation to harbor development; a study of the geology of the serpentine marble deposits of Cardiff, Md.; structure of the Monroe shale belt; economic and structural character of the slates of eastern Tennessee; correlation of the Chattanooga black shale to other black shales of southeastern United States; extent and character of the loess deposits of the Mississippi Valley; characteristics of triassic deposits of North Carolina and structural relations to other triassic areas of eastern North Carolina; studies in the origin of continents and mountain building; field work in geo-physical methods of prospecting; investigation of the foraminifera of the coastal plain of North Carolina; structure and economic character of the Holston marble northeast of Knoxville, Tenn.; structure of the paleozoic rocks of the Salem-Roanoke, Va., area; and an investigation of possible grain-producing soils.

Graduate Degrees in Geology

The course leading to the degree of Master of Science in Geology is open to students who have graduated with the degree of Bachelor of Science in Geology in the University of North Carolina, and to students who have completed the equivalent of a course as prescribed by the University. The course consists of a special research in some one branch of geology, pursued throughout the year, and six weeks in in field work in the summer under the direction of a member of the graduate faculty, followed by the completion of the investigation during the fall term. These researches constitute six full courses for the master's degree. In addition to this major, the candidate must complete three approved courses in one or more of the following departments: chemistry, physics, civil engineering, zoölogy, or botany.

For the degree of Doctor of Philosophy the same procedure is followed, except that after the first year of study less attention is paid to credit gained for courses and more stress is put upon independent work.

Geological Laboratories and Museum

The geological laboratories occupy the New East Building, recently rebuilt. The laboratories are well supplied with minerals, rocks, thin rock sections, materials for study of economic geology,

lantern slides, maps, charts, microscopes, and instruments for advanced work.

The geological museum on the first floor of New East contains large collections of minerals, rocks, and fossils. It is open daily to the student body and the public.

Courses for Graduates and Advanced Undergraduates

111-112 (11-12). ECONOMIC GEOLOGY. Prerequisite, Geology 11-12, 43-44, Chemistry 1-2.

Lectures, laboratory work, and reports. During the fall quarter the nonmetallic minerals will be studied. The metallic minerals will be considered in the winter quarters. *Five hours a week, lectures and laboratory, fall and winter quarters.* (1931-1932 and alternate years.) *Laboratory fee, $3.50 a quarter.* Professor Prouty.

121-122 (15-16). STRUCTURAL AND FIELD GEOLOGY. Prerequisite, Geology 11-12.

Lectures, with laboratory, field work, problems, and conferences. The first quarter deals with structural geology and map interpretation; the second quarter with geological note taking, surveying, map making, and field practice. (1930-1931 and alternate years.) *Five hours a week, lectures and laboratory, fall and winter quarters. Laboratory fee, $3.50 a quarter.* Professor Prouty.

123 (17). OIL GEOLOGY. Prerequisite, Geology 121-122.

Lectures, laboratory work, and reports. A study of the origin, distribution, and accumulation of petroleum, with special relation to the oil fields of North America; methods of prospecting for oil, recovery of oil, the valuation of oil properties. *Five hours a week, lectures and laboratory, spring quarter. Laboratory fee, $3.50.* Professor Prouty.

131 (61). ADVANCED CRYSTALLOGRAPHY.

This course includes a detailed consideration of the nature of crystals and crystalline substances, the use of both contact and reflecting goniometer, and crystal drawing. Open to students who have had Chemistry 1-2 and Geology 43-44. *Five hours a week, lectures and laboratory, spring quarter. Laboratory fee, $3.50.* Professor MacCarthy.

133 (13). PETROLOGY. Prerequisite, Geology 11-12, 43-44, Chemistry 1-2.

Laboratory work on rocks; a study of the origin, classification, and distribution of rocks. *Five hours a week, lectures and laboratory, spring quarter. Laboratory fee, $3.50.* Professor Prouty.

134 (14). PETROGRAPHY. Prerequisite, Geology 11-12, 43-44, Chemistry 1-2.

Lectures, laboratory work on the microscopic physiography of the rock forming minerals; optical mineralogy and the theory of light as applied to the polarizing microscope; minerals as observed in thin rock sections. *Five hours a week, lectures and laboratory, spring quarter. Laboratory fee, $3.50.* Professor Prouty.

141-142-143 (51-52-53). ADVANCED FIELD WORK AND SPECIAL RESEARCH IN GEOLOGY AND GEOGRAPHY.

Problems and work adapted to the special needs of the student. For graduates and for specially prepared seniors. Students in this course are expected to keep Saturday open for field work. These courses may be continued under the same numbers for more than one year as the subject advances, credit being given for each repetition. *Five hours a week, fall, winter, and spring quarters.* Professors Cobb, Prouty, Swartz, MacCarthy.

148-149 (93-94). SUMMER FIELD COURSE IN GEOLOGY.
This course is similar to 48-49 but is to be given in alternate years and in a different type of geological area.

171-172-173 (71-72-73). ADVANCED PALEONTOLOGY.
A study of the classification and generic and specific determination of the invertebrata, chiefly fossil. *Five hours a week, lectures and laboratory, fall, winter, and spring quarters. Laboratory fee, $3.50 a quarter.* Professor Swartz.

174-175-176 (74-75-76). ADVANCED PALEONTOLOGY.
A study of the anatomy, classification, and generic and specific determination of the higher invertebrata, chiefly fossil. (Given in 1932-1933, and in alternate years.) *Five hours a week, lectures and laboratory, fall, winter, and spring quarters. Laboratory fee, $3.50 a quarter.* Professor Swartz.

181-182-183 (81-82-83). ADVANCED HISTORICAL GEOLOGY. Prerequisite, Geology 11-12.
A study of the principles of historical geology and stratigraphy, the history of stratigraphic geology, the origin of the earth, and the geography, life, and geologic events of the Archaeozoic, Proterozoic, and Paleozoic eras of the earth's history. *Five hours a week, fall, winter, and spring quarters.* Professor Swartz.

191, 192, 193 (55, 56, 57). APPLIED GEOPHYSICS. Prerequisite, Mathematics 24, 25.
A survey of geophysical methods used for the detection of ore deposits, oil, etc.; a description of geophysical instruments and their use; actual geophysical surveys of selected areas about Chapel Hill. *Three lecture and four laboratory hours a week, fall, winter, and spring quarters.* Professor Swartz.

Courses for Graduates

304-305-306 (104-105-106). SPECIAL RESEARCH IN GEOLOGY AND GEOGRAPHY.
The student is expected to devote six weeks to work in the field, accompanied by the instructor, and to work up his results during the first quarter of the college year. The entire research constitutes three courses. These courses may be continued under the same numbers for more than one year as the subject advances, credit being given for each repetition. *Equivalent of five hours a week, fall, winter, and spring quarters.* Professors Cobb, Prouty, Swartz, MacCarthy.

307-308-309 (107-108-109). SPECIAL RESEARCH.
Special research in economic geology, in historical geology, in paleontology, petrology and petrography, and in geography, two quarters of which must be taken as a seminar course. These courses may be continued under the same numbers for more than one year as the subject advances, credit being given for each repetition. *Equivalent of five hours a week, fall, winter, and spring quarters.*
The Geological Seminar meets weekly for the review and discussion of current geological literature, and for the presentation of original papers.

DEPARTMENT OF GERMANIC LANGUAGES

WALTER DALLAM TOY, KENT JAMES BROWN, Professors.
ERNST CHRISTIAN PAUL METZENTHIN, Associate Professor.

The courses for advanced undergraduates and graduates offered by the Department of Germanic Languages are designed to meet

the needs of three classes of students: those whose interest in language and literature prompts them to pursue their German studies beyond the undergraduate stage; those who are preparing to teach in schools and private academies; and those who intend to adopt the study of Germanic languages as a profession.

For all of these classes the department offers courses covering different periods of the language and literature. The dialect courses are intended primarily for those who will specialize in Germanic languages.

The department is laying the foundation for a library adequate for research in special fields, notably at present for problems relating to Goethe, for the dramatic work of Kleist, Grillparzer, and Hebbel, for the history of the German novel, and for the old Saxon epic, the *Heliand.*

The critical apparatus is carefully chosen. There are complete biblographies and full sets of the leading journals. All scholarly editions of important monuments of literature from the Gothic period to the present time are available, as well as many valuable monographs. The latter embody the results of research both in philology and literature.

Requirements of Candidates for Advanced Degrees

In case the preparation of candidates is not adequate in the judgment of the department, the right is reserved to supplement this training by preparatory courses.

Candidates for the master's degree should have, in addition to their special work, a general acquaintance with the history of the German language and literature. Of candidates for the doctor's degree there will be expected a more detailed acquaintance with the history of the language and literature, in addition to the special investigation of some particular period.

In all cases the candidates should have a command of colloquial German, and to this end some residence in Germany is most desirable.

Courses for Graduates and Advanced Undergraduates

101-102 (41-42). *GOETHE. STUDY OF HIS LIFE. Prerequisite, five courses in German. This course may be elected only after consultation with the instructor.

Reading and interpretations of the more representative works. Lectures and reports. *Gœtz von Berlichingen, Werthers Leiden, Tasso, Gedichte, Wilhelm Meister, Herman und Dorothea, Briefe, Dichtung und Wahrheit. Five hours a week, two quarters, on application.* Professor Brown.

103-104 (43-44). *GOETHE'S FAUST. Prerequisite, five courses in German, exclusive of German 51. This course may be elected only after consultation with the instructor.

* NOTE: Courses 101, 102, 103, 104, 111, 203, 207, 241, 221, 223, 225 will be given if they are desired by a sufficient number of students. In any case the department reserves the right to withdraw a course for which the registration is very small. Of courses 221, 223, 225, 251 only one will be given in any quarter.

Goethe: *Faust*, Parts I and II. *Five hours a week, two quarters, on application.* Professor Toy.

111 (45). *GERMAN DRAMA IN THE NINETEENTH CENTURY. Prerequisite, six courses in German, exclusive of German 51.
Kleist, Grillparzer, Hebbel, Ludwig, Hauptmann. Reading, lectures, reports. *Five hours a week, one quarter, on application.* Professor Brown.

Courses Primarily for Graduates

For Courses 121 and 123, see Comparative Literature, Courses 121 and 123.

201 (101). *GOTHIC. Prerequisite, six courses in German, exclusive of German 51.
Braune's *Gotische Grammatik*, or Wright's *Gothic Grammar;* select parts of Paul's *Grundriss der Germanischen Philologie.* Introduction to Germanic philology. *Five hours a week, one quarter, on application.* Professor Toy.

203 (103). *OLD HIGH GERMAN. Prerequisite, six courses in German, exclusive of German 51.
Braune's *Althochdeutsche Grammatik;* Braune's *Althochdeutsches Lesebuch. Five hours a week, one quarter, on application.* Professor Toy.

207 (107). *MIDDLE HIGH GERMAN. Prerequisite, six courses in German, exclusive of German 51.
Middle High German grammar. Wide reading. *Five hours a week, one quarter, on application.* Professor Brown.

221 (111). *INTRODUCTION TO COMPARATIVE PHILOLOGY. Prerequisite, one classical and one modern foreign language. This course may be elected only after consultation with the instructor.
Theories of the origin and development of human speech; primitive languages (American Indian); classification and history of languages; peculiarities of the Semitic branch (Hebrew); the Indo-European branch; classical languages; Baltic Slavonic and Romance group (especially French); Germanic family. *Five hours a week, one quarter, on application.* Professor Metzenthin.

223 (113). *GERMANIC PHILOLOGY. Prerequisite, advanced English and German.
After a survey of the Indo-European family of languages the pre-historic, Primitive Germanic language is explained and from it, as their source, the various Germanic dialects are traced and their historical developments discussed. An introduction to the reading and interpretation of Germanic manuscripts will be given. Seminar course. Credit will be given only for research work of scholarly character. *Five hours a week, one quarter, on application.* Professor Metzenthin.

225 (115). OLD SAXON
Introduction to the grammar and syntax of the Old Saxon dialect. Comparison with Gothic, Old High German, and Old English. Study of *Heliand* and *Genesis* as well as of the minor Low German prose documents of the 9th and 10th centuries, based on Otto Basler, *Altsächsisch* (Freidburg, 1923). *Five hours a week, one quarter, on application.* Professor Metzenthin.

241 (109). *THE ROMANTIC SCHOOL IN GERMANY.
Five hours a week, one quarter, on application. Professor Brown.

* NOTE: Courses 101, 102, 103, 104, 111, 203, 207, 241, 221, 223, 225, will be given if they are desired by a sufficient number of students. In any case the department reserves the right to withdraw a course for which the registration is very small. Of courses 221, 223, 225, 251 only one will be given in any quarter.

251 (117). HISTORY OF GERMAN LITERATURE FROM 1500 TO 1750. Stress is laid on the religious (polemic, lyric) literature of the German reformation in the 16th century, with Luther as the spiritual center and as the founder of the modern German language; on the overwhelming influence of foreign literature during the 17th century; and on the reaction in the first half of the 18th century. *Five hours a week, one quarter, on application.* Professor Metzenthin.

DEPARTMENT OF HISTORY AND GOVERNMENT

Robert D. W. Connor, Joseph Gregoire de Roulhac Hamilton, Henry McGilbert Wagstaff, William Whatley Pierson, Jr., Edward James Woodhouse, *Mitchell Bennett Garrett, †Wallace Everett Caldwell, Loren Cary MacKinney, Professors.

Keener Chapman Frazer, Fletcher Melvin Green, Associate Professors.

Charles Christopher Crittenden, William Sumner Jenkins, Assistant Professors.

The Library

The library resources for graduate study in history at the University of North Carolina offer exceptionally rich materials in two fields: those of North Carolina history and of the South. The University has had the good fortune to acquire the collection of Dr. Stephen B. Weeks, which contains more than 10,000 titles of books, pamphlets, newspapers, and manuscripts relative to the history of North Carolina. This collection, together with other works possessed by the library, particularly those placed there by the North Carolina Historical Society, and with the manuscripts of the North Carolina Historical Commission, to which students may have access, must be regarded by historians as one of the important collections of the United States. The Kenan fund for materials on the Civil War period has enabled the library to secure a constantly increasing collection in that field. Through the generosity of Mr. John Sprunt Hill, of Durham, N. C., the library has been able to acquire further rare materials on North Carolina history. Endowments and other gifts recently received are enabling the library to build up one of the noteworthy collections of materials on the history of the South. Recent additions, including a partially complete set of Hansard reports and an important group of books, documents, and pamphlets have been made, respectively, in English and in Hispanic-American history. The Peabody Collection provides a basis for the study of international law and diplomacy. In the Kidder, Clark, Bridgers, and Howard collections the University library has a noteworthy group of newspaper materials. The University is conveniently

* Absent on leave, fall quarter, 1930, on the Kenan Foundation.
† Absent on leave, winter and spring quarters, 1931, on the Kenan Foundation.

located with reference to other libraries, especially to the Library of Congress and to the North Carolina State Library in Raleigh.

History Seminar Room

The history seminar room, equipped with tables and filing cases, is a repository of important newspaper collections. It is the headquarters for graduate students in history and is situated within easy access to the stacks.

Publications

Under the direction of the department, there is published the *James Sprunt Historical Studies.* Established by the late Dr. James Sprunt, of Wilmington, N. C., the publication has at present twenty-one volumes. The contents, it may be noted, have in the main been relative to North Carolina state and colonial history and government, but by recent action its scope has been enlarged to embrace general history and political science. Its pages have been open to students, as well as to specialists.

HISTORY

Courses for Graduates and Advanced Undergraduates

101. PERIOD STUDIES IN GREEK HISTORY.
This course will be devoted to an intensive study of the sources, literature and historical problems of a selected period of Greek history. For the year 1931-1932 attention will be directed to the history of the Greek world from the end of the Peloponnesian War, 404 B.C., to the battle of Chæeonea in 338 B.C., with special interest in the social and economic phases of the period. (Offered in 1931-1932.) *Five hours a week, winter quarter.* Professor Caldwell.

102. PERIOD STUDIES IN ROMAN HISTORY.
A course in a selected period of Roman history, given for the same class of students and under the same conditions as History 101. The period to be treated in 1932-1933 will be the Augustan Age. (Offered in 1932-1933.) *Five hours a week, winter quarter.* Professor Caldwell.

121. MEDIEVAL CIVILIZATION.
An intensive study of the classical cultural heritage of the Middle Ages; medieval "revivals" of learning during the eras of Theodoric the "Civilizer," Charlemagne, Alfred, Otto I, and the eleventh-twelfth centuries; the problem of the cultural "Dark Age" and "Renaissance"; the evolution of medieval culture; ecclesiastical and secular architecture; sculpture and painting; the literature of the clergy, nobility, and common folk; historical writing, science, philosophy; the development of schools and universities; music. Lectures, library reading, and reports. (Offered in 1931-1932.) *Five hours a week, spring quarter.* Professor MacKinney.

122. SOCIAL-ECONOMIC HISTORY OF THE MIDDLE AGES.
An intensive study of the social and economic life of the medieval clergy, nobility, city folk, and peasantry; agricultural life and the development of the manorial system; industrial life and the rise of craft guilds; local and distant commerce; fairs, trade-routes, and the development of business technique; merchant guilds and leagues; the influence on social-economic life of the decline of Rome, the coming of the Teutons, the Church, the Crusades, and voyages

of discovery. Lectures, library reading, and reports. (Offered in 1932-1933.) *Five hours a week, spring quarter.* Professor MacKinney.

131 (37). THE PROTESTANT REVOLT.
An intensive study of religious, political, intellectual, and economic conditions on the eve of the Protestant Revolt, of the movements led by Luther, Zwingli, Calvin, Knox, and Henry VIII, and of the Catholic Reformation. (Offered in 1931-1932.) *Five hours a week, spring quarter.* Professor Garrett.

132 (45). THE RISE OF ABSOLUTISM IN EUROPE.
A study of the rise of absolutism in Europe. A detailed study of the Thirty Years War, France under Henry IV, Richelieu, Mazarin, and Louis XIV, the rise of Prussia, Sweden from Gustavus Adolphus to the death of Charles XIII, the decline of Poland and Turkey, and the development of Russia to the death of Peter the Great. (Offered in 1932-1933.) *Five hours a week, spring quarter.* Professor Garrett.

133 (40). THE FRENCH REVOLUTION.
An intensive study of the causes, events, and results of the French Revolution. (Offered in 1931-1932.) *Five hours a week, fall quarter.* Professor Garrett.

134 (42). THE NAPOLEONIC PERIOD.
A detailed study of the chief events and movements of the Napoleonic period. Particular attention will be paid to the immediate effects of the period on the states surrounding France and to the permanent results of the period in Europe. (Offered in 1931-1932.) *Five hours a week, winter quarter.* Professor Garrett.

135 (43). RISE OF DEMOCRACY AND NATIONALISM IN MODERN EUROPE.
An intensive study of the period of restoration and reaction, the revolutions of 1830 and 1848, the rise of socialism, the unification of Italy and of Germany, France under Louis Philippe, the Second French Republic, and Napoleon III. (Offered in 1932-1933.) *Five hours a week, fall quarter.* Professor Garrett.

136 (44). RECENT AND CONTEMPORARY EUROPEAN HISTORY.
A study of the recent history of France, Germany, Italy, Austria-Hungary, and Russia, the causes of the Great War, the chief events of the war, the treaties of peace, the attempt to organize the world after the war, and recent movements in Europe. (Offered in 1932-1933.) *Five hours a week, winter quarter.* Professor Garrett.

137 (39). ENGLAND IN THE NINETEENTH CENTURY.
The purpose of this course is to effect an intensive treatment of a relatively short period of English history, that from 1815 to 1915. The course will develop England's national and imperial story, her international relations, and her contributions to the history of the age. Lectures and readings. *Five hours a week, spring quarter.* Professor Wagstaff.

151 (53). THE FEDERAL PERIOD (1783-1815).
An intensive study is made of the government under the Articles of Confederation, the formation and adoption of the Federal Constitution, the nature of the Union, the launching of the government, Jeffersonian democracy, the westward movement, and the Second War for Independence. Textbook, lectures, readings, and reports. (Offered in 1932-1933.) *Five hours a week, fall quarter.* Professor Green.

152 (54). THE ANTE-BELLUM PERIOD (1815-1860).
A social, economic, and political study of the period—the westward movement, states' rights philosophy, Jacksonian democracy, development of Nation-

alism, controversy over Negro slavery, the rise of Southern Rights, and the causes of the stroke for Southern Independence. Textbook, lectures, readings, and reports. (Offered in 1931-1932.) *Five hours a week, fall quarter.* Professor Green.

153 (55). SECESSION AND CIVIL WAR.
Beginning with a rapid survey of the states' rights theory and of the secession movement before 1860, the course deals with the important constitutional, political, and economic aspects of the Civil War in the United States. Lectures, readings, and reports. (Offered in 1932-1933.) *Five hours a week, winter quarter.* Professor Hamilton.

154 (56). THE RECONSTRUCTION PERIOD.
A course dealing with the constitutional, political, social, and economic aspects of the period from the close of the Civil War in 1865 to the restoration of home rule in the South in 1877. Lectures, readings, and reports. (Offered in 1931-1932.) *Five hours a week, winter quarter.* Professor Hamilton.

155 (57). RECENT AMERICAN HISTORY, 1876-1898.
In this course emphasis will be placed upon the influence of the Civil War and Reconstruction upon subsequent American history; the war amendments in theory and practice; business and politics; the Granger movement; the currency question; the tariff legislation; the trust problem; foreign relations; the Spanish-American War and its results; party politics; political dissent; and interpretation of democracy. Lectures, textbooks, and readings. (Offered in 1931-1932.) *Five hours a week, spring quarter.* Professor Pierson.

156 (58). RECENT AMERICAN HISTORY, 1898-1920.
Continuation of History 155. A course dealing with the political, economic, social, and diplomatic history of the United States from 1898 to 1920. Conservatism, moderation, and radicalism in politics and economics; social legislation; American imperialism and increased participation in international relations; the World War; and the problems of peace. Lectures, textbooks, and readings. (Offered in 1932-1933.) *Five hours a week, spring quarter.* Professor Pierson.

161 (59). NORTH CAROLINA, 1663-1789.
General survey of the settlement of North Carolina and its territorial expansion; the origin and development of its political institutions; the influences affecting its growth and development; immigration and the development of social and economic life; political and constitutional controversies; intercolonial and imperial relations; revolution and independence; the adoption of a constitution and organization of the state government; Federal relations and formation of the Federal Union. Lectures, readings, and reports. *Five hours a week, fall quarter.* Professor Connor.

162 (60). NORTH CAROLINA, 1789-1900.
General survey of conditions at the close of the 18th century; origin and development of political parties; sectional controversies; political and constitutional development; education, internal improvements, and railroads; Federal relations; the slavery controversy; secession, civil war and reconstruction; restoration of home rule; the rise of Populism; the era of fusion; "white supremacy"; recent political, educational, and industrial development. Lectures, readings, and reports. *Five hours a week, winter quarter.* Professor Connor.

163 (61). THE SOUTH, 1789-1860.
A course dealing with the Southern States in the period preceding the Civil War, in which emphasis will be laid upon social, economic, and political organization and movements. Lectures, readings, and reports. (Offered in 1931-1932.) *Five hours a week, winter quarter.* Professor Hamilton.

164 (62). THE SOUTH, 1877-1925.
A course which deals with the economic, social, and political development of the Southern States since the close of Reconstruction. Emphasis will be laid upon the rise of industry in the South and its results. Lectures, readings, and reports. (Offered in 1932-1933.) *Five hours a week, winter quarter.* Professor Hamilton.

165 (63). HISTORY OF THE WEST.
A study of the westward movement of civilization from 1763 to the opening of the 20th century in the area now comprising the United States; the conditions and processes of migration into the various areas; and the social, economic, and political influence of the frontier. Textbook, lectures, readings, and reports. (Offered in 1931-1932.) *Five hours a week, winter quarter.* Professor Green.

166 (64). THE FRONTIER IN AMERICAN HISTORY.
A study of the general significance of the frontier in American civilization; the problems of the West, its contributions to American Democracy, Western ideals, and the reaction of the frontier influences upon the East. Lectures, readings, and reports. (Offered in 1932-1933.) *Five hours a week, winter quarter.* Professor Green.

167 (65). AMERICAN ECONOMIC HISTORY.
This course will deal with the economic materials, institutions, conflicts, and transitions in the history of the United States from its origin as a part of the British economic empire to its development as one of the economic powers in the present world, with some regard for the social and political implications involved in this development. *Five hours a week, spring quarter.* Professor Crittenden.

168 (66). SOCIAL AND EDUCATIONAL HISTORY OF THE UNITED STATES. (Education 143).
The social and educational institutions and practices of the United States are traced through: (a) the period of transplanting of European institutions; (b) the period of modifications of institutional life to meet new conditions; and (c) the period of development of a social and an educational system of free common schools, high schools, and higher and technical education in harmony with the political and social ideals and institutions of America. Textbook, lectures, investigations, and reports. *Five hours a week, fall or spring quarter.* Professor Knight.

Courses for Graduates

201ab (151ab). HISTORIOGRAPHY.
Lectures, conferences, readings, and reports. The first quarter will be concerned with methods of research, schools of interpretation, and the interrelation of history with the other social sciences. The second quarter will be a seminar in the history and bibliography of history. Required of all graduate students in history and government. *Three hours a week, fall and winter quarters.* Professor Caldwell.

211 (119). THE ENGLISH BACKGROUND OF THE AMERICAN REVOLUTION.
A survey of England's eighteenth century political, social, and economic conditions and their relations to the American Revolution. Lectures and reports. *Five hours a week, fall quarter.* Professor Wagstaff.

220 (120). PRELIMINARIES OF THE AMERICAN REVOLUTION.
A study of the background and causes of the American Revolution. Lectures and reports. (Offered in 1932-1933.) *Five hours a week, spring quarter.* Professor Connor.

221. THE WAR OF AMERICAN INDEPENDENCE.
A study of its political, social, and economic aspects. Lectures, readings, and reports. (Offered in 1931-1932.) *Five hours a week, spring quarter.* Professor Connor.

271 (70). HISPANIC-AMERICAN HISTORY: The Colonial Period and the Wars of Independence.
In this course a general survey will be made of Spanish and Portuguese America from the establishment of colonial settlements through the wars of independence. A study of the transplantation of Hispanic civilization in language, customs, religion, trade, and political institutions; Indian relations; labor and social conditions; education and industry; the causes and events of the struggles for independence. Lectures and readings. *Five hours a week, fall quarter.* Professor Pierson.

272 (71). HISPANIC-AMERICAN HISTORY: Development of Nationality in South America.
The modern history of Argentina, Brazil, Chile, Uruquay, Paraguay, Peru, Bolivia, and Ecuador. Attention will be directed to the establishment of these republics, the evolution of their political theory, the struggle for political stability, the exploitation of resources, the diplomatic and commercial relations with the United States and Europe, the international problems of South America, the contemporary progress in politics and society. Lectures and readings. (Offered in 1931-1932.) *Five hours a week, winter quarter.* Professor Pierson.

273 (72). HISPANIC-AMERICAN HISTORY: Hispanic North America and the Caribbean Countries.
Emphasis in this course will be placed upon the same general factors as in History 272. The diplomatic and commercial relations of the United States and Mexico, the insular republics, the Central American countries, and Colombia, Panama, and Venezuela will receive special attention. Lectures and readings. (Offered in 1932-1933.) *Five hours a week, winter quarter.* Professor Pierson.

301abc (110abc). ANCIENT HISTORY.
A seminar in some phase of ancient history. *Conference, one hour a week, fall, winter, and spring quarters.* Professor Caldwell.

311abc. MEDIEVAL HISTORY.
A seminar in some phase of the medieval social history. *Conference, one hour a week, fall, winter, and spring quarters.* Professor MacKinney.

321abc (113abc). MODERN EUROPEAN HISTORY.
A seminar in some phase of the Napoleonic period. *Conference, one hour a week, fall, winter, and spring quarters.* Professor Garrett.

331abc. AMERICAN COLONIAL HISTORY.
A seminar in some selected phase. *Conferences and reports, one hour a week, fall, winter, and spring quarters.* Professor Connor.

333abc (116abc). HISTORY OF THE UNITED STATES, 1783-1860.
A seminar in some phase of the history of the United States, 1783-1860. *Conference, one hour a week, fall, winter, and spring quarters.* Professor Green.

341 (141). SEMINAR COURSE.
A research course in a special field under the direction of a member of the department.

370abc. HISPANIC-AMERICAN HISTORY.
A seminar in some selected phase. *Conference, one hour a week, fall, winter, and spring quarters.* Professor Pierson.

GOVERNMENT

Courses for Graduates and Advanced Undergraduates

121 (35). THE GOVERNMENT OF ENGLAND.
The objective in this course is a knowledge of the development and operation of the English government. Local, national, and imperial aspects of England's government practice will receive attention. Resemblances and contrasts between her government and that of our own country will be pointed out for the practical lessons which the parallel supplies. Lectures and readings. *Five hours a week, spring quarter.* Professor Wagstaff.

122 (42). GOVERNMENT AND ADMINISTRATION OF EUROPEAN CITIES.
A general consideration of principles and methods of social control in the municipalities of Great Britain, France, and Germany, with some attention to those of other nations. Comparisons with American conditions. *Five hours a week, spring quarter.* Professor Woodhouse.

131 (38). AMERICAN STATE GOVERNMENT.
A study in the principles, organization, and administrative methods of state government. In connection with the course will be a special study of the government of North Carolina. Lectures, readings, and reports. *Five hours a week, winter or spring quarter.* Professor Jenkins.

132 (36). AMERICAN MUNICIPAL GOVERNMENT.
An historical survey of the development of governmental structure, theory, and functions in American municipalities, and careful analysis of existing municipal conditions, with special attention to city and town government in North Carolina. Each student will make an intensive study of his own or of some other city or town. *Five hours a week, fall quarter.* Professor Woodhouse.

133 (37). AMERICAN MUNICIPAL ADMINISTRATION.
Special study of the principles and problems of administration in American municipal corporations, of such functions as police, public education, charities and correction, local improvements, public health, finances, with emphasis on city and town administration in North Carolina. Each student will select and study exhaustively a municipal problem in one municipality. *Five hours a week, fall quarter.* Professor Woodhouse.

134 (43). COUNTY GOVERNMENT AND ADMINISTRATION.
A study of the forms of organization, the functions, and the operation of county government in the United States and especially in North Carolina, in their historical development but with special emphasis on present conditions and tendencies and on possible improvements. Each student will be required to study, as extensively and as intensively as possible, the government and administration of one county, preferably his home county, and to put his results in essay form. Regular class discussion will be based on the best general texts, the North Carolina Constitution, Statutes and Supreme Court decisions, and on special studies of individual counties already made and being made in the University. A fair minimum of required reading will be assigned and wider reading encouraged. *Five hours a week, spring quarter.* Professor Woodhouse.

141 (40). INTERNATIONAL LAW.
A study will be made of the rules observed by the states of the world concerning their relations in peace and in war. Lectures and the preparation of typical cases by the students. *Five hours a week, fall quarter.* Professor Frazer.

142 (41). INTERNATIONAL RELATIONS.
The problems of nationalism and internationalism, of imperialism, and the settlement of international conflicts will be considered in this course. It is

designed to introduce the student to the basic facts of world politics. Lectures, readings, and reports. *Five hours a week, winter quarter.* Professor Frazer.

143 (48). AMERICAN DIPLOMACY.
The course will be concerned with a survey of the diplomatic relations of the United States from the period of the American Revolution to the World War. Particular attention will be directed to the development of American foreign policies and American contributions to international public law. Lectures and reports by students. *Five hours a week, spring quarter.* Professor Frazer.

151 (30). THE ELEMENTS OF POLITICAL SCIENCE.
A general course in which a study is made of the principles of political science and of the important theories respecting the nature, origin, forms, and ends of the state and of government. An examination of the literature of the subject will be made, supplemented by students' reports on selected political theorists. Lectures, textbooks, and readings. *Five hours a week, fall quarter.* Professor Pierson.

152 (50). HISTORICAL JURISPRUDENCE.
A survey of the historical development of Roman and Anglo-American law, with some consideration of their relations to the Babylonian, Greek, Hebrew, and other systems of law, and with special consideration of their influence in the modern world. *Five hours a week, winter quarter.* Professor Woodhouse.

153 (46). POLITICAL THOUGHT OF THE EIGHTEENTH CENTURY.
An analysis of political thought and philosophy, 1750-1800. Emphasis will be placed on the study of the philosophical ideas of the American and French revolutions. Lectures and reports. *Five hours a week, winter quarter.* Professor Pierson.

154 (47). DEVELOPMENT OF THE ENGLISH CONSTITUTION.
A general course surveying the origin and development of the Constitutional machinery of the British monarchy. Emphasis will be laid on the successive Constitutional landmarks from the Norman Conquest to the Parliament Act of 1911. Lectures, textbooks, and readings. *Five hours a week, winter quarter.* Professor Wagstaff.

155 (34). THE CONSTITUTION OF THE UNITED STATES.
An elementary course in constitutional law covering by means of lectures, textbooks, and cases the fundamental principles of constitutional interpretation and practice in the United States. *Five hours a week, fall quarter.* Professor Jenkins.

Courses Primarily for Graduates

301abc (106abc). MODERN INTERNATIONAL RELATIONS.
Seminar in international relations. An analysis will be made of the major problems of international relations. Emphasis will be placed upon the elements of nationalism and internationalism, imperialism, and the settlement of international disputes. *Two hours a week, fall, winter, and spring quarters.* Professor Frazer.

311abc (100abc). AMERICAN POLITICAL THEORY.
A seminar course respecting the political philosophy that has been developed in the United States. In the fall quarter the political theory of the colonial period and the American Revolution will be studied; in the winter quarter attention will be given to the theories associated with the formation of the Constitution and its early interpretation, the nature of the Union, and the slavery dispute; in the spring quarter the political theory of the Civil War and

the contemporary United States will be considered. Lectures, readings, and reports. *Two hours a week, fall, winter, and spring quarters.* Professor Pierson.

321abc (110abc). SEMINAR ON STATE AND LOCAL GOVERNMENT. Intensive studies of various functions, organs, and problems of public administration in states of the United States and in their sub-divisions. Comparison of various attempts to reorganize state administrative systems. *Two hours a week, fall, winter, and spring quarters.* Professor Woodhouse.

341 (141). SEMINAR COURSE.
A research course in a special field under the direction of a member of the department.

DEPARTMENT OF MATHEMATICS

ARCHIBALD HENDERSON, JOHN WAYNE LASLEY, JR., ALLAN WILSON HOBBS, Professors.

ARTHUR SIMEON WINSOR, ERNEST LLOYD MACKIE, EDWARD TANKARD BROWNE, JOE BURTON LINKER, Associate Professors.

The subject of mathematics constitutes the foundation upon which the general subject of engineering, in its broader aspects, solidly rests. This is true of such subjects as electrical, chemical, and mining engineering; more especially, all work in scientific design of structures and in civil engineering depends upon minute and detailed knowledge of mathematical laws and principles.

On the pedagogical side many of the courses, in particular those in pure mathematics, are designed for the student who intends to become a teacher in the schools or a professor in college or university. In the light of the advance of mathematical science and the wide ramifications of the more modern branches, many courses are offered to enable the student to specialize along a number of different lines. A group of courses permits specialization in the general subject of geometry; another group of courses deals with the broad division of analysis; a third grouping permits specialization in mechanics.

The Resources of the Department

In Phillips Hall are located the departments of Mathematics, Physics, Civil, Electrical, and Mechanical Engineering. This concentration of allied departments in a single building affords exceptional advantages. The lecture halls and seminar rooms, departmental offices convenient for consultation, well-equipped testing rooms and laboratories, and commodious, well-lighted quarters for students in drawing—all are found beneath a single roof. In this building is a group departmental library, rich in works in mathematics—pure and applied—physics, and engineering—civil, electrical, and mechanical. The department now occupies quarters on the second floor of the new wing of Phillips Hall, with class, office, and conference rooms.

Requirements for Advanced Degrees

The courses in the major subjects are to be selected from the courses enumerated and described below, reference being had to the particular degree sought. The courses may be grouped under three main divisions: analysis, geometry, and mechanics. The grouping and order of the courses will be arranged by conference between professor and student, the controlling factors being the previous preparation and training of the student and the particular degree sought.

The courses in the minor subjects, as a rule, will be chosen from the general fields of the allied and related sciences, such as physics, astronomy, and engineering—civil, electrical, and chemical; however, if desired, all of the work may be done in the major subjects.

For the candidate for an advanced degree, a reading knowledge of French and German is desirable; indeed, in the case of the candidate for the degree of Doctor of Philosophy, familiarity with French and German scientific terminology and facility in the reading of foreign journals are required.

Courses for Graduates and Advanced Undergraduates

103 (s64a). INTRODUCTION TO HIGHER GEOMETRY. Prerequisite, Mathematics 25.
This is a teachers' course for graduate credit, especially devised for teachers who are candidates for the A.M. degree. The course deals with the properties of the triangle and circle from the modern point of view, poles and polars, harmonic division, transformation by reciprocal radii, Brocard points and circles, etc. (Summer 1932 and alternate years.) Professor Henderson.

105 (s80). HISTORY OF MATHEMATICS.
The historical development of the topics of arithmetic, algebra, geometry, trigonometry, and analytical geometry. Biographical sketches of great mathematicians and their contributions to mathematics. (Summer 1931 and alternate years.) Professor Lasley.

106 (s81). THE TEACHING OF MATHEMATICS.
The purpose, value, and content of courses in high school mathematics; applications of mathematics; junior high school mathematics. Recent changes in the methods of studying mathematics. A careful study will be made of the recommendations of The National Committee on Mathematical Requirements. (Summer 1931 and alternate years.) Professor Browne.

121 (s65). THEORETICAL MECHANICS.
An introductory course in mechanics employing the methods of the calculus. (Summer 1932 and alternate years.) Professor Hobbs.

131 (50). THEORY OF EQUATIONS. Prerequisite, Mathematics 25.
Indispensable for students intending to prosecute studies in the higher branches of pure mathematics. Such subjects as the solution of equations of higher degree, transformations, determinants, elimination, invariants and covariants, and symmetric functions are treated in detail. The student is afforded a survey of the general problem and the basic principles of the formation, handling, and evolution of equations. *Five hours a week, winter quarter.* Professor Linker.

141 (51). DIFFERENTIAL EQUATIONS. Prerequisite, Mathematics 24 or 24E.

This is a course both for students intending to specialize in mathematics and for students in advanced engineering, civil, electrical, and chemical. Among the subjects treated are singular solutions, applications to mechanics, geometry, and physics, linear equations with both constant and variable co-efficients, equations involving more than two variables, partial differential equations, and spatial forms. *Five hours a week, fall quarter.* Professor Browne.

150 (s52). SYNTHETIC PROJECTIVE GEOMETRY. Prerequisite, Mathematics 25.

A geometric account of the fundamental notions of projective geometry: one-to-one correspondence, dimensionality, projective correspondence between forms of one and two dimensions, poles and polars, involution, projective and metric theory of conics. (Summer 1931 and alternate years.) Professor Lasley.

151 (53) PROJECTIVE HOMOGENEOUS COÖRDINATES AND THEIR APPLICATIONS. Prerequisite, Mathematics 25.

A study of the general homogeneous coördinates of forms of one, two, three, and four dimensions; cross ratio and its properties; ideal elements; duality; projective correspondence; transformation of coördinates; the elements of line geometry. *Five hours a week, fall quarter.* Professor Lasley.

152 (54). ANALYTIC PROJECTIVE GEOMETRY. Prerequisite, Mathematics 151.

The projective theory of binary forms; the conic as a rational curve; the conic as a ternary form; the conic from the viewpoint of the theory of correlations; functional determinants and invariants; selected topics from higher geometry. *Five hours a week, winter quarter.* Professor Lasley.

161 (55). ANALYTIC GEOMETRY OF SPACE. Prerequisite, Mathematics 25.

Spatial relations are treated from the analytic standpoint. Deals with quadric surfaces, envelopes, foci, quadriplanar and tetrahedral coördinates, developable surfaces, curves in space, curvature of surfaces, higher surfaces, etc. *Five hours a week, winter quarter.* Professor Henderson.

171 (59). ADVANCED CALCULUS. Prerequisite, Mathematics 25.

This course completes and rounds out the subject as given in Mathematics 25. Stress upon rigor in demonstration. Designed to meet the particular needs of the class, e.g., problem course on study of special functions. Thorough knowledge of calculus is the aim of the course. *Five hours a week, winter quarter.* Professor Mackie.

Courses Primarily for Graduates

206 (101). THEORY OF FUNCTIONS OF A COMPLEX VARIABLE. Prerequisite, Mathematics 131, 141, 171.

Complex numbers, differentiation and integration, conformal mapping, linear fractional transformations, single and multiple valued functions. *Five hours a week, winter quarter.* Professor Mackie.

211 (61). VECTOR ANALYSIS. Prerequisite, Mathematics 121 and 141.

A study of some of the general principles of mechanics in the language of vectors. *Five hours a week, fall quarter.* Professor Hobbs.

216 (60). DYNAMICS. Prerequisite, Mathematics 211.

Differential equations of motion, equations of orbits, D'Alembert's principle, motion of a rigid body. *Five hours a week, winter quarter.* Professor Hobbs.

221 (70). PARTIAL DIFFERENTIAL EQUATIONS. Prerequisite, Mathematics 141.
Partial differential equations and their applications. *Five hours a week, spring quarter.* Professor Hobbs.

226 (62). FOUNDATIONS OF GEOMETRY. Prerequisite, Mathematics 151.
A course designed to meet the needs of students experienced in mathematical thinking. A survey of the contributions of Pasch, Peano, Hilbert, and their school to our knowledge of the foundations of geometry; a study of the axioms, of systems of geometry, etc. (1931-1932 and alternate years.) *Five hours a week, winter quarter.* Professor Henderson.

231 (104). THEORY OF NUMBERS. Prerequisite, Mathematics 131.
An elementary course in the study of the properties of the rational integers, including the study of the question of divisibility, greatest common divisor of two or more integers, solution of simple congruences, quadratic residues, quadratic reciprocity law, representation of integers by quadratic forms, equivalence of quadratic forms, etc. *Five hours a week, spring quarter.* Professor Browne.

236 (102). HIGHER PLANE CURVES.
A course dealing with plane curves, particularly conics, cubics, and quartics; polarity, Plücker formulas, curve of Hesse, Steiner, and Cayley; classification of cubics, intersections of curves, singularities of curves, unicursal curves. *Five hours a week, spring quarter.* Professor Lasley.

241 (103). LIE THEORY OF DIFFERENTIAL EQUATIONS. Prerequisite, Mathematics 141.
A study of differential equations from the point of view of continuous groups. (1931-1932 and alternate years.) *Five hours a week, spring quarter.* Professor Hobbs.

246 (108). MODERN HIGHER ALGEBRA. Prerequisite, Mathematics 131.
Polynomials and their fundamental properties, determinants, theory of linear dependence, linear equations, matrices, invariants, bilinear and quadratic forms. (1931-1932 and alternate years.) *Five hours a week, fall quarter.* Professor Browne.

251 (109). ELEMENTS OF NON-EUCLIDEAN GEOMETRY. Prerequisite, Mathematics 151.
The subject is treated chronologically. The contributions of Saccheri, Bolyai, Lobachewsky, Riemann, Cayley, Klein are studied, analyzed, and compared. *Five hours a week, fall quarter.* Professor Henderson.

256 (110). ALGEBRAIC INVARIANTS.
An introduction to the non-symbolic theory of invariants of binary forms with applications to geometry, followed by an explanation of the symbolic notation of Clebsch with practice in its use. Based on Dickson's *Algebraic Invariants. Five hours a week, winter quarter.* Professor Browne.

261 (105). DIFFERENTIAL GEOMETRY. Prerequisite, Mathematics 141 and 152.
A study of the metric differential geometry of curves, surfaces, and curves on surfaces, systems of curves defined by differential equations, surfaces given by two quadratic differential forms. (1931-1932 and alternate years.) *Five hours a week, spring quarter.* Professor Lasley.

266 (100). THEORY OF FUNCTIONS OF A REAL VARIABLE. Prerequisite, Mathematics 131, 171.

The real number system from the standpoints of Cantor and Dedekind, elementary theory of point sets, limits, series, implicit functions, Riemann and Lebesgue integrals. (1931-1932 and alternate years.) *Five hours a week, fall quarter.* Professor Mackie.

271 (106). INTRODUCTION TO THE THEORY OF RELATIVITY. Prerequisite, Mathematics 121 and 141.

In this course the essential features of the special and general relativity theories of Einstein are set forth from the mathematical point of view. Particular study is made of the Lorentz transformation, the theory of tensors, the absolute differential calculus, and the three crucial tests of the theory. (1931-1932 and alternate years.) *Five hours a week, winter quarter.* Professor Henderson.

272 (107). ADVANCED RELATIVITY THEORY.

Restricted relativity, with applications to physical and electrical problems. General relativity and gravitation. Geodesics and curvature in space-time. Cosmological speculations as to a finite, unbounded universe. Theories of Einstein and DeSitter. (1931-1932 and alternate years.) *Five hours a week, spring quarter.* Professor Henderson.

281 (111). CALCULUS OF VARIATIONS. Prerequisite, Mathematics 266.

A study of various kinds of minimizing problems, determining functions which minimize certain definite integrals. Isoperimetric problems. Necessary conditions for an extreme as deduced by Euler, Weierstrass, Legendre, and Jacobi, and conditions sufficient to ensure such an extreme. (1931-1932 and alternate years.) *Five hours a week, winter quarter.* Professor Mackie.

286 (112). PROJECTIVE DIFFERENTIAL GEOMETRY. Prerequisite, Mathematics 151, 261.

A study of the projective properties of curves and ruled surfaces by means of the invariants and covariants of systems of homogeneous differential equations. *Five hours a week.* Professor Lasley.

291 (113). INTRODUCTION TO THE THEORY OF FINITE GROUPS. Prerequisite, Mathematics 131.

Deals with the theory of substitutions in general, and as applied to the algebraic equation. Simple and compound groups, transitivity and primitivity. Cyclic and linear groups, linear fractional substitutions, etc. Numerous applications in algebra and geometry. *Five hours a week, spring quarter.* Professor Henderson.

SEMINAR AND THESES

Reading and research in mathematics conducted by members of the department, as follows:

351 (141). Thesis work and Seminar. Professor Henderson.

356 (141). Thesis work and Seminar. Professor Lasley.

361 (141). Thesis work and Seminar. Professor Hobbs.

366 (141). Thesis work and Seminar. Professor Winsor.

371 (141). Thesis work and Seminar. Professor Mackie.

376 (141). Thesis work and Seminar. Professor Browne.

DEPARTMENT OF PHILOSOPHY

HENRY HORACE WILLIAMS, Professor.

STEPHEN ALBERT EMERY, Assistant Professor.

Attention is called to the Graham Kenan Fellowship in Philosophy, which yields $1,500 annually and may be held by one person for several years. The department will be interested in hearing from anyone who desires to pursue the study of philosophy until some positive and lasting result is reached.

Courses for Graduates and Advanced Undergraduates

131-132-133 (10-11-12). LOGIC AND CIVILIZATION.
The purpose of this course is to show how intelligence works both in the individual and in the currents of thought that constitute civilization. The student will be furnished a kit of tools with which to solve some of the problems which will confront him in living his own life and understanding the world about him. *Five hours a week, fall, winter, and spring quarters.* Professor Williams.

171 (20). ETHICS.
The course seeks insight into points of view rather than knowledge of detail. It will consider the subject matter and methods of ethics, its position within philosophy as a whole, various meanings of *right* and *good*, and ultimate criteria of ethical values. Lectures and discussion. *Five hours a week, winter or spring quarter.* Dean Bradshaw.

Courses Primarily for Graduates

224-225-226 (160-161-162). KANT.
An intensive study of the *Critique of Pure Reason* with important commentaries, in the light of Kant's whole philosophy and its historical context. *Five hours a week, fall, winter, and spring quarters.* Professor Emery.

227-228-229. STUDIES IN HEGEL.
This course aims to consider Hegel's system as grounded in the *Logik* and exhibited in the *Phenomenologie. Five hours a week, fall, winter, and spring quarters.* Professor Williams.

301-302-303 (140-141-142). SEMINAR IN PHILOSOPHY.
Conducted by the department. Hours and subjects are arranged at the beginning of the year. Credit, one-half course each quarter.

311 (135). SPECIAL READINGS.
Reading in a special field under the direction of a member of the department.

DEPARTMENT OF PHYSICS

OTTO STUHLMAN, JR., Professor.

*EARLE KEITH PLYLER, Associate Professor.

The Department of Physics is offering a cycle of courses which extends over a period of two years, the object of which is to provide a

* Absent on leave, 1930-1931.

thorough knowledge of the underlying principles of the subject in its various ramifications. The aim is to present the subject in its modern aspect with sincerity and thoroughness, requiring at the same time sufficient work in the laboratory to provide the necessary first-hand contact with the material under consideration.

The student majoring in chemistry, mathematics, geology, and allied fields will find here a group of subjects from which to choose a minor that will help him interpret his specialty and develop a broader point of view.

The addition to Phillips Hall, in which the Department of Physics occupies the first and ground floors of the west wing, has made it possible to extend its research facilities so that advanced students may occupy separate research laboratories in which they may pursue their investigations. These laboratories are equipped with gas, water, dark rooms, and intercommunicating electric power facilities.

Special attention is given to research in ultra-voilet spectra and electron phenomena. Recent additions in equipment have made it possible to pursue special problems in infra-red absorption and radiation.

The department library, located on the third floor of Phillips Hall, is in possession of complete files of the leading journals, handbooks, and monographs on modern physics.

In order to pursue graduate work successfully, a reading knowledge of German and French is required of all candidates for advanced degrees who major in physics.

Courses for Graduates and Advanced Undergraduates

101 (6). MECHANICS AND WAVE MOTION. Prerequisite, Physics 1-2, Mathematics 24.
Lectures, problems. Required in all majors and minors in physics. *Five hours a week, fall quarter.* Professor Stuhlman.

102 (5). HEAT AND THERMODYNAMICS. Prerequisite, Physics 1-2, Mathematics 24.
Lectures, problems, and laboratory work. *Four lecture and two laboratory hours a week, winter quarter. Laboratory fee, $3.00.* Professor Plyler.

103 (7). MODERN ELECTRICAL THEORY. Prerequisite, Physics 1-2, Chemistry 1-2.
Lectures; the electron theory, atomic structure, radio-activity, etc. *Five hours a week, spring quarter.* Professor Stuhlman or Professor Plyler.

104 (8). ADVANCED ELECTRICITY AND MAGNETISM. Prerequisite, Physics 1-2, Mathematics 24.
An introduction to the mathematical treatment of these subjects. *Four lecture and two laboratory hours a week, winter quarter. Laboratory fee, $3.00.* Professor Plyler.

105 (9). OPTICS. Prerequisite, Physics 1-2.
A treatment of the fundamental principles of geometrical and physical optics. Lectures, problems, and laboratory work. *Four lecture and two laboratory hours a week, winter quarter. Laboratory fee, $3.00.* Professor Stuhlman.

106 (10). INTRODUCTION TO MATHEMATICAL PHYSICS. Prerequisite, Mathematics 24 or its equivalent.
(Offered in 1932 and alternate years.) *Five hours a week, spring quarter.* Professor Stuhlman.

107 (12). ADVANCED GENERAL LABORATORY.
This course affords an opportunity for further training and experimental study in physics not given in other courses. *Six laboratory hours a week, every quarter. Laboratory fee, $3.00.* Professors Stuhlman, Plyler.

Courses Primarily for Graduates

202 (119). THEORY OF HEAT. Prerequisite, Mathematics 25.
Conductivity. Kinetic theory of gases. Change of state. Thermodynamics. Radiation and temperature. *Five hours a week, fall quarter.* Professor Plyler.

203 (115). ATOMIC STRUCTURE. Prerequisite, Physics 103, Mathematics 24.
A critical survey of the experimental and theoretical evidence in various branches of physics for the present theories of the structure of atoms and molecules, the nature of magnetism, etc. A reading knowledge of German is required. *Five hours a week, spring quarter.* Professor Stuhlman.

204 (116). MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM. Prerequisite, Mathematics 24.
General electrostatic theory; ideal electric fields; condensers with homogeneous and non-homogeneous dielectrics; general laws of conduction; thermal effects; magnetostatic fields; electro-magnetic phenomena; electric waves. *Five hours a week, winter quarter.* Professor Stuhlman.

205 (117). THEORY OF LIGHT. Prerequisite, Mathematics 24.
1. Geometrical optics. 2. Physical optics. 3. Optical properties of crystals and metals. 4. Magneto-optics and radiation. A reading knowledge of French and German is required. *Five hours a week.* Professor Stuhlman.

301 (141). RESEARCH.
Intended for applicants for advanced degrees. Experimental work. Subject must be assigned or approved by the professor in charge. A reading knowledge of French and German is required. Professors Stuhlman, Plyler.

NOTE. Courses in advanced and analytic mechanics are offered by the Department of Mathematics.

DEPARTMENT OF PSYCHOLOGY

JOHN FREDERICK DASHIELL, HARRY WOLVEN CRANE, ENGLISH BAGBY, Professors.

The emphasis of the work in the Department of Psychology is primarily along the lines of interest in the science for its own sake; and students who are interested in the subject as an independent natural science are given opportunity and coöperation in research. In addition, the demand on the part of other fields for definite and reliable knowledge of human nature, especially in the various professional schools, amounts to a call for coöperation from this department; and some of the instruction and research are shaped with a

view to supplying such assistance to education, medicine, commerce, sociology, etc.

The New West Building has been completely remodeled; with the exception of a portion of the third floor reserved for the Dialectic Literary Society, which has been housed in the building for many years, it has been rebuilt throughout to answer the needs of the Department of Psychology. On the first floor are located a lecture room, a classroom, a large class laboratory, two seminar rooms, and private offices. On the second floor are arranged a library, a classroom fitted with tables, a large class laboratory, three rooms for clinical examinations, an apparatus and supply room, a shop, and a private office. Space on the third floor is planned especially for research, the two ends of the building making room for seven small private rooms and an animal room, with a mezzanine room especially built to be soundproof and lightproof. The building is piped throughout for water and for gas, and electric supplies of both alternating and direct current in low and high voltages are made available at numerous outlets in the different laboratories. The technical equipment is practically complete. It includes sufficient duplication of apparatus for the experimental work in the various undergraduate courses, a fairly complete stock of standard apparatus for training in experimental methods, and sufficient apparatus and funds for the prosecution of research along most of the recognized psychological lines. The departmental library includes all the technical journals published in English and a few in other languages. The supply of books is fairly complete.

A member of the department is psychopathologist to the State Board of Charities and Public Welfare, supervising the mental examination of abnormal cases throughout the state, and the properly interested and qualified graduate student is given opportunities here. Psychological assistance is given by the department to educational interests in the state, especially in the way of tests and measurements, mental hygiene, and problems in learning. It is hoped that resources will soon permit coöperation also with other lines of work in the state, particularly commercial, industrial, and legal.

The courses listed primarily for graduates are selected with the aim of providing such as will be intensive and extensive preparation in "pure" psychology. They are of a nature to be best fitted for those who wish to give themselves a thorough and sound purchase on psychology as their major subject, as well as naturally to be recommended to students majoring in another department. Interests in applied psychology in its varied forms—educational, economic, social, medical, etc.—are well met by many of the courses listed for graduates and advanced undergraduates.

Courses for Graduates and Advanced Undergraduates

NOTE. Psychology 21 and 22 (General Psychology) or their equivalent are prerequisite for each of the following courses.

125 (25). ANIMAL PSYCHOLOGY.
Reading topics: evolution of structure and behavior (Parker, Child, Coghill), tropic behavior (Jennings, Loeb), instinctive (Peckhams, Lubbock, Stone), habitual (Thorndike, Yerkes, Watson, and others), reflex (Sherrington, Pavlov), insight (Köhler), motivation (Moss, Richter). The class will conduct a protracted experimental study in animal learning. *Five hours a week, winter quarter. Laboratory fee, $2.00.* Professor Dashiell.

126 (26). CHILD PSYCHOLOGY.
This course is primarily a critical examination of the experimental methods used in child psychology. The members of the class will be given an opportunity of repeating some of the major experiments. The chief subdivisions to be studied are the original behavior equipment, the growth and maturation of structure, the acquisition of habits, the development of capacity, and the formation of interests. Lectures, readings, and experiments with children. *Five hours a week, fall quarter. Laboratory fee, $1.50.* Professor Bagby.

135 (35). ECONOMIC PSYCHOLOGY: INDUSTRIAL AND VOCATIONAL.
There will be two main divisions of the course, as follows: (1) The adjustment of the worker to his work—including industrial training, effects of incentive, monotony, and fatigue; motion study and mental hygiene in industry. (2) The selection of personnel for various kinds of work, with the industrial use of tests of intelligence and personality. An outline of vocational psychology will be given, and the psychology of salesmanship discussed. Lectures, experiments, readings. *Four lecture and two laboratory hours a week, spring quarter. Laboratory fee, $2.00.* Professor Bagby.

136 (36). ECONOMIC PSYCHOLOGY: ADVERTISING.
An attempt is made to present systematically those aspects of psychology which will aid the advertiser more effectively to construct and present his advertisements. While aiming to give information of practical value, the emphasis is placed upon the establishment of a point of view which will be of assistance in the development of a general technique on the part of the advertiser. *Four lecture and two laboratory hours a week, winter quarter. Laboratory fee, $2.00.* Professor Crane.

138 (38). LEGAL PSYCHOLOGY.
The course is organized about some of the major problems of psychological nature with which the law is concerned; such as, the accuracy of testimony, the reliability of findings by juries, responsibility and criminal psychology, the effects of punishment, modes of detecting suppression of guilty knowledge. The aim is to obtain an accurate knowledge of the present status of each problem, and the method will be that of a natural science approach leading ultimately to implications of practical legal character. Readings, lectures, and experiments. *Five hours a week, spring quarter. Laboratory fee, $1.00.* Professor Dashiell.

140 (40). PSYCHOLOGY OF PERSONALITY.
This course is a consideration of certain of the factors upon which the quality of human adjustments depends. Emphasis is placed upon emotional reactions as primary sources of motivation and an attempt is made to indicate the most effective methods of training and of retraining the various types of emotional reactions. *Five hours a week, fall quarter.* Professor Bagby.

145 (45). ABNORMAL PSYCHOLOGY: FEEBLE-MINDEDNESS.
Presentation of the psycho-neural aspects of feeble-mindedness in general, and of the various types, together with their importance in relation to the problems of education, dependency, and delinquency. There will be discussion and demonstration of the various clinical methods of determination and classifica-

tion of feeble-mindedness. (Given alternately with Psychology 147.) *Five hours (lectures and equivalent laboratory) a week, winter quarter. Laboratory fee, $1.00.* Professor Crane.

146 (46). ABNORMAL PSYCHOLOGY: PSYCHONEUROSES AND PSYCHOSES.
A study is made of the more important deviations from the normally reacting and experiencing human organism. Attention is given to the sensory, imaginal, emotional, motor, etc., abnormalities and to the occurrence of these in the various psychoses. Brief surveys are given of the methods of clinical psychology and of psychotherapy. *Five hours (lectures and equivalent laboratory) a week, spring quarter. Laboratory fee, $1.00.* Professor Crane.

147 (47). ABNORMAL PSYCHOLOGY: METHODS OF MENTAL EXAMINATION.
A presentation of the various psychological methods used in the clinical study of individuals. This includes a study of the methods used in determination of the presence or absence of specialized defects as well as the determination of level of intelligence. Lectures, experiments, readings. (Given alternately with Psychology 145.) *Four lecture and two laboratory hours a week, winter quarter. Laboratory fee, $2.00.* Professor Crane.

151, 152, 153 (51, 52, 53). EXPERIMENTAL PROBLEMS.
To the student who finds himself especially interested in some particular problem of psychology, perhaps as growing out of the subject matter of one of the preceding courses, encouragement and opportunity are here offered for investigative study. May be elected any quarter, and for one, two, or three quarters. *One lecture and eight laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $2.00 a quarter.* Professors Dashiell, Crane, Bagby.

190 (106). CONTEMPORARY PSYCHOLOGICAL TENDENCIES.
A systematic survey of the more outstanding recent and contemporary movements in modern psychology. Readings assigned in the works of Wundt and Titchener, James, Hall, McDougall and Stout, Thorndike, Watson, Freud, Jung, Köhler, Koffka, and perhaps others. *Five hours a week, fall quarter.* Professor Dashiell.

Courses Primarily for Graduates

201 (101). ADVANCED EXPERIMENTAL PSYCHOLOGY.
A training course in the technique of psychological experimentation and research, to acquaint the student both with methods and with typical forms of apparatus. A survey will be made of experimental technique in the study of the various motor, sensory, thinking, and emotional functions, including both introspective and behavioristic approaches. *One lecture and eight laboratory hours a week, fall quarter. Laboratory fee, $2.00.* Professor Dashiell.

202-203 (102-103). RESEARCH IN PSYCHOLOGY. Prerequisite, Psychology 101.
Opportunity will be given for the experimental investigation of special problems along the line of the individual student's interests. The personal and material resources of the department are here especially offered. *Ten laboratory hours a week, winter and spring quarters. Laboratory fee, $2.00 a quarter.* Professors Dashiell, Crane, Bagby.

205 (105). PHYSIOLOGICAL PSYCHOLOGY.
An intensive study is made. Emphasis is placed upon the neural mechanism as a basis of understanding both the mental and the reaction phenomena of psychology. *Five hours (lectures and equivalent laboratory) a week, fall quarter. Laboratory fee, $2.00.* Professor Crane.

208 (108). SOCIAL PSYCHOLOGY.
Several relatively unrelated problems are treated in this course. The feeble-minded, the insane, and the criminal types are characterized, and suggestions are offered for the solution of the social problems involved. The immigration policy of the United States is critically studied from a psychological point of view. Typical mob reactions, especially lynching episodes, are analyzed. Finally, a study is made of the conditions conducive to the development of national spirit and other forms of loyalty. *Five hours a week, winter quarter.* Professor Bagby.

325 (135). SEMINAR.
An advanced course devoted to the extensive or intensive survey of current or of historical material bearing upon some limited problem or field of psychology—such as motivation, emotion, thinking, the Gestalt movement, reflexology, etc. The problem studied will be varied from year to year. *Five hours a week, fall, winter, or spring quarter, to be specially announced.* Professors Dashiell, Crane, Bagby.

341-342 (140-141). ADVANCED RESEARCH.
Experimental or clinical research to be done by advanced graduate students only. *Fall, winter, or spring quarter.* Professors Dashiell, Crane, Bagby.

The student is referred also to courses in Educational Psychology given by Professors Jordan and Trabue in the Department of Education, numbers 71, 103, 173, and 271; in Neurology, Anatomy 6, given by Professor Mangum in the School of Medicine; and in Statistics, Economics 71, given by Professor Ferger.

DEPARTMENT OF ROMANCE LANGUAGES

WILLIAM MORTON DEY, STURGIS ELLENO LEAVITT, URBAN TIGNER HOLMES, JR., NICHOLSON BARNEY ADAMS, Professors.

HOWARD RUSSELL HUSE, JOHN CORIDEN LYONS, Associate Professors.

GEORGE WARD FENLEY, RALPH STEELE BOGGS, STERLING AUBREY STOUDEMIRE, Assistant Professors.

Department Regulations

All candidates for higher degrees are required to have a knowledge of Latin. This may be construed to mean an elementary knowledge in certain cases. Candidates for the degree of Master of Arts are strongly advised to have a reading knowledge of German, as well as of French. Those who intend to pursue the degree of Doctor of Philosophy are required to have this reading knowledge by the general regulations of the Graduate School.

Candidates for the degree of Master of Arts who major in Spanish must choose French as their minor subject. Those who choose French as a major usually pursue their minor work in Spanish or Italian; they may, after consultation with the chairman, substitute Latin, Comparative Literature, German, or English.

Before the degree of Doctor of Philosophy will be awarded, the candidate must have spent six months in the country of his major

interest, three months of which must have been spent in work upon his thesis. This requirement is usually satisfied in two summers abroad.

Library Facilities

The library is a subscriber to some fifty current periodicals in which space is given either wholly or in part to the Romance languages and literatures. The complete files of nearly all of these journals are in our possession. The collection of books is especially rich in Romance linguistics, Medieval French literature, French literature of the sixteenth and nineteenth centuries, and in Spanish literature of the seventeenth century and contemporary periods. The other periods are well represented. The collection also contains such important series as *Les Documents inédits de la France,* and the Champion edition of Stendhal (not yet completed). The library is also purchasing photostat copies of early books and manuscripts. A photostating machine is owned by the University and is at the disposal of faculty and research students.

FRENCH

Courses for Graduates and Advanced Undergraduates

109 (19). THE FRENCH NOVEL. Prerequisite, French 22.
A study of the development of the novel in France. Lectures, readings, reports. (Offered in 1932-1933 and in alternate years.) *Five hours a week, winter quarter.* Professor Dey.

115 (24). FRENCH LYRIC POETRY. Prerequisite, French 22.
A study of French lyric poetry, beginning with Villon. Lectures, readings reports. *Five hours a week, spring quarter.* Professor Huse.

126 (26). HISTORY OF THE FRENCH LANGUAGE. Prerequisite, French 22.
A general survey from the origins to the present day, with especial emphasis upon the period, 1500-1900: the influence of the Erudits, Precieuses, Philosophes, and Romanticists; spelling reforms. *Five hours a week, winter quarter.* Professor Holmes.

131 (17). THE FRENCH DRAMA PRIOR TO 1700. Prerequisite, French 22.
A survey of the religious and comic theatres of the Middle Ages; the theatre of the Renaissance and its relation to the classic theatres of Greece and Rome; the neo-classic theatre of the seventeenth century. *Five hours a week, winter quarter.* Professor Fenley.

132 (18). THE FRENCH DRAMA SINCE 1700. Prerequisite, French 22.
A survey of modern French drama with special attention to the theatrical principles and ideas of the different dramatic schools of the last two centuries. *Five hours a week, spring quarter.* Professor Fenley.

145 (14). FRENCH PHONETICS. Prerequisite, French 21.
A detailed study of the French vowel and consonant sounds by the phonetic method. This course is required of candidates for the master's degree, and it should be elected by anyone who intends to teach French. *Five hours a week, fall quarter.* Professor Dey.

161 (21). THE SIXTEENTH CENTURY. Prerequisite, French 22.
A general treatment of the chief movements in French literature of the 16th century, with some reference to the Italian Renaissance and its influence on France. Specimen readings from the more important poets and prose writers: Marot, Rabelais, the Pléiade, Montaigne, etc. *Five hours a week, spring quarter.* Professor Lyons.

171 (11). FRENCH LITERATURE OF THE SEVENTEENTH CENTURY. Prerequisite, French 22.
A study of the period of Henry IV and Louis XIII. *Five hours a week, fall quarter.* Professor Lyons.

172 (12). FRENCH LITERATURE OF THE SEVENTEENTH CENTURY. Prerequisite, French 22.
This course deals with the literature of the reign of Louis XIV. *Five hours a week, winter quarter.* Professor Lyons.

181 (13). FRENCH LITERATURE OF THE EIGHTEENTH CENTURY. Prerequisite, French 22.
Voltaire, Montesquieu, Rousseau, les Encyclopédistes. A study of the literary movement of the century and of the origins of romanticism. (Offered in 1932-1933 and in alternate years.) *Five hours a week, fall quarter.* Professor Huse.

191 (15). FRENCH ROMANTICISM. Prerequisite, French 22.
French literature from 1800 to 1850, with special stress on the works of the romantic poets, Lamartine, Hugo, Vigny, and Musset. Lectures, reading, reports. *Five hours a week, fall quarter.* Professor Dey.

192 (16). FRENCH LITERATURE SINCE 1850. Prerequisite, French 22.
A study of the later literary movements of the 19th century, with some emphasis on the contemporary period. Lectures, readings, reports. *Five hours a week, winter quarter.* Professor Dey.

Courses Primarily for Graduates

221-222-223 (121-122-123). OLD FRENCH.
Reading of the oldest texts: *La Chanson de Roland; Aucassin et Nicolette; Chrétien de Troyes.* Lectures on French phonology and morphology. *Five hours a week, fall, winter, and spring quarters.* Professor Holmes.

225 (125). PROVENCAL.
A study of the ancient language and literature of Provence. The poetry of the Troubadours. (Offered in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Holmes.

231 (131). FRENCH SYNTAX.
The most important phases of modern French syntax studied from a historical point of view. (Offered in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor Dey.

248 (108). FRENCH LITERATURE OF THE 14TH AND 15TH CENTURIES. Prerequisite, French 221 or 265.
A combination of literary survey and reading course. Especial attention will be paid to Villon, who will be read entire with commentary. General treatment of such writers as Machaut, Froissart, Christine de Pisan, etc. (Offered in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor Holmes.

265-266 (105-106). FRENCH LITERATURE OF THE RENAISSANCE. A study of French literature of the sixteenth century. Italian and French Humanism. The reformation. Marot, Rabelais, Calvin, the Pléiade, Montaigne. (Offered in 1932-1933 and in alternate years.) *Five hours a week, winter and spring quarters.* Professor Lyons.

331 (110). HISTORY OF FRENCH LITERATURE PRIOR TO 1300. Lectures and seminar papers. A complete and careful study of the origins of French literature, with emphasis upon the twelfth century Renaissance, the period of the epics, beginning of romances, etc. French 221 is desired, though not a prerequisite. (Offered in 1931-1932 and in alternate years.) *Five hours a week, fall quarter.* Professor Holmes.

391 (101). STUDIES IN ROMANTICISM. Prerequisite, French 191. Seminar course. Intensive study of one of the Romantic poets. (Offered in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Dey.

395 (141). RESEARCH. Research in a special field under the direction of a member of the department.

CELTIC 205 (105). MIDDLE IRISH. Grammar and reading of texts. Dottin, *Manuel de l'Irlandais Moyen, Táin Bó Cúailnge* (supplement to *Eriu*). *Five hours a week, winter quarter.* Professor Holmes.

SPANISH

Courses for Graduates and Advanced Undergraduates

109 (19). EARLY SPANISH PROSE FICTION. Prerequisite, Spanish 22. A study of the origins and developments of the novel in Spain up to the time of Cervantes. (Offered in 1932-1933 and in alternate years.) *Five hours a week, fall quarter.* Professor Adams.

110 (20). THE SPANISH NOVEL. 1605-1898. Prerequisite, Spanish 22. A survey of the novel from Cervantes through the nineteenth century. (Offered in 1932-1933 and in alternate years.) *Five hours a week, winter quarter.* Professor Adams.

111 (21). MODERN SPANISH NOVELISTS. Prerequisite, Spanish 22. A study of the "Generation of '98," with consideration of present day tendencies. (Offered in 1932-1933 and in alternate years.) *Five hours a week, spring quarter.* Professor Adams.

115 (15). EARLY LYRIC POETRY. Prerequisite, Spanish 22. A survey of lyric poetry in the Spanish peninsula from the origins through the Siglo de Oro. (Offered in 1931-1932 and in alternate years.) *Five hours a week, fall quarter.* Professor Adams.

116 (16). MODERN LYRIC POETRY. Prerequisite, Spanish 22. Brief treatment of the poetical schools of Seville and Salamanca in the eighteenth century and study of Spanish lyric poetry through the nineteenth century to the present day. (Offered in 1931-1932 and in alternate years.) *Five hours a week, winter quarter.* Professor Adams.

131 (11). LOPE DE VEGA AND HIS CONTEMPORARIES. Prerequisite, Spanish 22. Reading of representative plays of Lope de Vega, Tirso de Molina, Guillén de Castro, Ruiz de Alarcón, etc. Lectures and reports. (Offered in 1931-1932 and in alternate years.) *Five hours a week, fall quarter.* Professor Leavitt.

132 (12). CALDERON AND HIS CONTEMPORARIES. Prerequisite, Spanish 22.
Reading of representative plays of Calderón de la Barca, Moreto, Rojas, etc. Lectures and reports. (Offered in 1931-1932 and in alternate years.) *Five hours a week, winter quarter.* Professor Leavitt.

134 (17). SPANISH DRAMA OF THE NINETEENTH CENTURY. Prerequisite, Spanish 22.
Reading of representative plays of this period. Lectures, oral and written reports. (Offered in 1932-1933 and in alternate years.) *Five hours a week, fall quarter.* Professor Leavitt.

135 (18). MODERN SPANISH DRAMA. Prerequisite, Spanish 22.
Reading of plays of Dicenta, Benavente, Linares Rivas, the Alvarez Quintero brothers, Marquina, Martínez Sierra, etc. Lectures, oral and written reports. (Offered in 1932-1933 and in alternate years.) *Five hours a week, winter quarter.* Professor Leavitt.

145 (14). SPANISH PHONETICS. Prerequisite, Spanish 21.
A detailed study of the Spanish vowel and consonant sounds by the phonetic method. This course is required of candidates for the master's degree, and it should be elected by anyone who intends to teach Spanish. *Five hours a week. spring quarter.* Professor Boggs.

Courses Primarily for Graduates

221-222 (121-122). OLD SPANISH.
Ford's *Old Spanish Readings.* The poem of the Cid and other old Spanish texts. Lectures on phonology, morphology, and syntax. *Five hours a week, fall and winter quarters.* Professor Boggs.

241 (131). INTRODUCTION TO SPANISH-AMERICAN LITERATURE.
A study of notable authors and consideration of present-day writers. (Offered in 1932-1933 and alternate years.) *Five hours a week, spring quarter.* Professor Leavitt.

391 (123). EARLY SPANISH LITERATURE. Prerequisite, Spanish 221-222.
Survey of medieval Spanish literature. *Five hours a week, spring quarter.* Professor Boggs.

393 (127). SPANISH ROMANTICISM. Seminar course.
General survey of the Romantic period in Spain and investigation of special problems. (Offered in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Adams.

395 (141). RESEARCH.
Research in a special field under the direction of a member of the department. Attention is called to Comparative Literature 157.

ITALIAN

Course for Graduates and Advanced Undergraduates

131 (12). DANTE. Prerequisite, Italian 51 and 52.
The *Vita Nuova* and the *Inferno,* with some reference to origins of Italian literature and to the poets of the *dolce stil nuovo.* (Offered in 1931-1932 and in alternate years.) *Five hours a week, spring quarter.* Professor Huse.

132 (13). DANTE. Prerequisite, Italian 131.
The *Purgatorio* and the *Paradiso.* (Offered in 1930-1931 and in alternate years.) *Five hours a week, spring quarter.* Professor Huse.

156 (56). DANTE IN ENGLISH TRANSLATION.
The *Vita Nuova* and the *Divine Comedy;* the precursors of Dante and the poets of the *dolce stil nuovo.* Special studies of Dante's political and social philosophy, with particular emphasis on Dante as a poet and as a guide. *Five hours a week, fall quarter.* Professor Huse.

161 (11). ITALIAN LITERATURE OF THE RENAISSANCE. Prerequisite, Italian 51 and 52.
Readings from the principal authors, with special emphasis on Ariosto, Machiavelli, Castiglione, and the lyric poets. Collateral reading on the history of Italian culture during the Renaissance. *Five hours a week, winter quarter.* Professor Huse.

Course Primarily for Graduates

221 (121). OLD ITALIAN.
Reading of the poets previous to Dante. Early monuments. Survey of phonology and morphology. (Offered in 1932-1933 and in alternate years.) *Five hours a week, fall quarter.* Professor Holmes.

DEPARTMENT OF RURAL SOCIAL-ECONOMICS

Eugene Cunningham Branson, Samuel Huntington Hobbs, Jr., Professors.

*Paul Woodford Wager, Assistant Professor.

The seminar library of the Department of Rural Social-Economics is perhaps the best library of its sort in the United States, particularly in county government, rail-and-water transportation, the country church, farm tenancy, land economics, and state aid to land ownership. It is well equipped with the rare literature of its special field of learning, with standard texts and reference volumes, current reports, bulletins, pamphlets, journals, magazines, and newspaper clippings, etc. It is also a clearing house of information about North Carolina—economic, social, and civil. The files of mounted clippings in rural-social-economic-civic subjects are indexed in accord with the index system of the general library.

Publications of the department consist of the North Carolina Club Year-Book containing particular studies of state-wide problems, and twenty-five numbers each year of the *University News Letter,* which for this the seventeenth year has been filled with particular economic-social-civic studies of county, state, and national affairs.

Course for Graduates and Advanced Undergraduates

101 (20). NORTH CAROLINA: ECONOMIC AND SOCIAL.
This course is designed to familiarize the student with North Carolina: population, agriculture, resources, social life, economic development, industry. *Five hours a week, fall or spring quarter.* Professor Hobbs.

* Absent on leave, 1930-1931.

Course for Graduates

271abc (105abc). RURAL SOCIAL PROBLEMS.
Designated readings on and class discussions of (1) the solitary farmstead and the country community, (2) farm tenancy, (3) country illiteracy, (4) the country school, (5) the country church, and (6) rural citizenship. *Five hours a week, fall, winter, and spring quarters.* Professor Branson.

301abc (113abc). RURAL ECONOMICS.
Research, seminars, and field investigations in (1) land economics—resources, values, ownership and tenancy, laws and policies; (2) farm organization and management—farm systems, farm finance, distribution of farm products and the farm income, coöperative farm enterprise; (3) country wealth, country institutions and problems; (4) state and county studies, economic, social, and civic; county bulletins, etc. Required preliminary preparation; approved courses in general and rural economics. Lacking such preparation, collateral courses in these subjects must be taken in residence here. *Five hours a week, fall, winter, and spring quarters.* Professors Branson, Hobbs, Wager.

305abc (115abc). COUNTY ADMINISTRATION.
Research, seminars, and field investigations of county organization, resources, institutions, and administration. Typical subjects for study might be: county consolidation, county management, tax resources, highway administration, the county home, the county jail, programs of economic and social development, county planning. Prerequisite, at least three courses in economics and government. *Five hours a week, fall, winter, and spring quarters.* Professor Wager.

311abc (117abc). RURAL SOCIAL PROBLEMS.
1. Research, seminars, and field investigations of (1) rural social institutions and agencies; (2) transportation and communication facilities in rural areas; (3) country-mindedness and its sequences; (4) town and country interdependencies; (5) social disability in country areas, our public welfare laws and agencies; (6) social aspects of tenancy and illiteracy; (7) state and county studies, economic, social, and civic; county bulletins, etc. 2. Rural Social Survey; research, technic, and field work. 3. Statistics; interpretation and use. 4. Rural Social Engineering: (1) county community studies; (2) community organization, economic and social; (3) county government; (4) country leadership, requisites and technic. Required preliminary preparation, approved courses in general and rural sociology. Lacking this, collateral courses in these subjects must be taken in residence here. *Five hours a week, fall, winter, and spring quarters.* Professors Branson, Hobbs, Wager.

DEPARTMENT OF SOCIOLOGY

*HOWARD W. ODUM, ERNEST R. GROVES, HAROLD D. MEYER, T. J. WOOFTER, JR., LUTHER LEE BERNARD, Professors.

WILEY B. SANDERS, GUY B. JOHNSON, RUPERT VANCE, ROY M. BROWN, Associate Professors.

LEE M. BROOKS, Assistant Professor.

The work in sociology in the University is organized around the Department of Sociology and the School of Public Welfare.

* Absent on leave as chief of the Social Science Division, "A Century of Progress," Chicago World's Fair Centennial Celebration, 1933.

To meet the specific needs of the state and the University, and to some extent the South, a fourfold service has been planned. The first emphasizes instruction in sociology and social problems, including teaching in the College and University, extension teaching through the Extension Division or outside communities, and through general instruction and promotion of citizenship. The second emphasizes training for social work and community leadership, with special reference to town, village, and rural communities, and with special application to the State of North Carolina and the South. This division hopes to meet the very urgent demands of the state for trained men and women for its county superintendents of public welfare and other official positions, and of many communities throughout the South for Red Cross secretaries and other community workers in the mill villages and elsewhere. The third aspect of the work emphasizes direct and indirect community service, or social engineering through avenues of community leaders, county superintendents of public welfare, local and district conferences, and community planning for leaders, industrial managers, and others. The fourth aspect emphasizes social research, scientific inquiry, and publication of results estimated to be of value to the state, the University, and to the general field of public welfare and social progress. A fifth general purpose, kept constantly in the foreground, provides that the school maintain close and cordial coöperation with the State Department of Public Welfare, with other state departments of public service, with other departments and schools of the University, and with local and voluntary agencies.

The Department of Sociology, like those of Economics, Government, Rural Social-Economics, and Education, works in close coöperation with the Institute for Research in Social Science, attempting to select the most important topics for fruitful research, to find available students to do the research, and to direct its progress. Among the subjects for special research this year are a half-dozen inquiries into social-industrial relationships. Other topics relate to rural leadership, to leadership in the South, studies in community organization, in poor relief, in juvenile delinquency, in public welfare, studies of crime in North Carolina.

Courses for Graduates and Advanced Undergraduates

152 (121). SOCIAL THEORY.
A survey of the range of contemporary social theory with preliminary consideration of its historical backgrounds. A study is made of contributions to theories of human ecology, regionalism, population, social differentiation, the social personality, mobility, human nature and culture, collective behavior, religion, art and the mores, the social processes, conflict, and social control. Leading theories are summarized, compared, and criticized. *Five hours a week, every quarter.* Professors Bernard, Vance.

160 (30). INTRODUCTION TO SOCIAL WORK.
Essentially a professional course in social problems with the emphasis laid

upon methods of treatment by public and private social agencies. After a brief discussion of the nature, purpose, and scope of social work the course will deal chiefly with the major social problems, such as poverty and destitution, physical and mental deficiency, disease, crime, and delinquency. Methods of education and training for social work will also be taken up in considerable detail. *Five hours a week, fall quarter.* Professor Sanders.

161 (11). THE FAMILY.
The history, purpose, and problems of the family with especial attention to social conditions influencing family life and to efforts for family conservation. Open to men and women. *Five hours a week, winter quarter.* Professor Groves.

164 (14). FAMILY CASE WORK.
Discussion of the relation of the individual to the family and the family to the community. The technique of case work and its scientific approach—methods of investigation, interviewing, social evidence, sources, diagnosis, treatment. Class work is supplemented by visits to social agencies in neighboring cities and by field work under the supervision of members of the staff of the School of Public Welfare. *Five hours a week, fall quarter.* Professor Sanders.

165 (15). ADVANCED FAMILY CASE WORK.
A continuation of Sociology 164, with more intensive study of case work. *Five hours a week, winter quarter.* Professor Sanders.

166 (40). PUBLIC WELFARE.
1. The organization of public welfare in the United States. 2. Detailed study of the North Carolina Plan. 3. Office organization and administration. Alternates with 167. (Not given in 1931-32.) *Five hours a week, fall quarter.* Professor Brown.

167 (41). SOCIAL LAWS.
The development of social legislation pertaining to important social problems. Special attention to social laws of North Carolina. Alternates with 166. (Given in 1931-1932.) *Five hours a week, fall quarter.* Professor Brown.

168 (8). COMMUNITY ORGANIZATION.
The community as a unit of work, problems of modern community life, principles underlying community organization, experiments in methods of community organization, development and coördination of community activities illustrated by case records, problems of community leadership. A critical review of the role of custom, habit, crisis, and gregariousness in community development. *Five hours a week, winter quarter.* Professor Brooks.

171 (4, 122). EDUCATIONAL SOCIOLOGY.
Education as a process of social control and achievement. The social resources of the school and other educational resources. Social problems of the teacher. *Five hours a week, winter quarter.* Professors Groves, Meyer.

173 (23, 24). PLAY AND RECREATION.
The theories of play, play activities, attitudes, history of the play movement, play leadership, programs, values, sex and age differences, classification of movements, application to community life. *Five hours a week, winter quarter.* Professor Meyer.

175 (25). EXTRA-CURRICULAR ACTIVITIES.
Clubs, student participation in school government, physical education, publicity in school publications, commencement, many miscellaneous topics—the assembly, festival days, suggestions to leaders, home room activities, programs,

dramatics, point systems, contributions from national agencies interested in extra-curricular activities, theoretical and practical studies of institutions promoting successful programs, bibliographical materials. *Three hours a week, spring quarter.* Professor Meyer.

185 (5). THE NEGRO.
A study of the American Negro, with particular reference to the South, the historical and cultural background of the Negro in Africa and in America; development since emancipation; bi-racial system; and problems of race relations. *Five hours a week, fall quarter.* Professors Woofter, Johnson.

186 (6). POPULATION.
A study of the backgrounds of immigration; the problems confronting the immigrant and the problems created by his presence in the United States; the processes involved in the assimilation of the immigrant, his children, and his grandchildren into our cultural life. *Five hours a week, spring quarter.* Professor Woofter.

192 (12). CRIME.
Nature and causes of crime; evolution of modern methods of criminal procedure; administration of penal and reformatory institutions; programs for the social treatment of the criminal; the problems of juvenile delinquency. The class work will be supplemented by field trips to criminal courts and penal institutions. *Five hours a week, winter quarter.* Professor Brown.

193 (13). SOCIAL PATHOLOGY.
A survey of the abnormal and pathological aspects of society. Among the problems studied are feeblemindedness, insanity, physical defectiveness, malnutrition, alcoholism, prostitution, vagrancy, family disorganization. Emphasis is given to methods of treatment by private and public institutions and agencies. Class work is supplemented by field trips to county and state institutions. *Five hours a week, spring quarter.* Professor Brown.

198 (28). JUVENILE DELINQUENCY.
This course deals with the diagnosis and treatment of juvenile delinquency from the social worker's viewpoint. Under diagnosis will be taken up the methodology of the social scientists in this field, and the evaluation of the different causative factors of juvenile delinquency. Under treatment will be covered the work of the juvenile court, probation, parole, and institutional care. *Five hours a week, winter quarter.* Professor Sanders.

199 (29). PUBLIC CARE OF CHILDREN.
This course is intended primarily for students who expect to follow social work as a profession. The major part of the course will be devoted to the study of methods and technique of the social agencies engaged in the social treatment of the different classes of children who stand in need of public care and protection, such as the delinquent child, the dependent or neglected child, the defective child, and children in employment. The latter part of the course will be devoted to a discussion of public responsibility for the welfare of children in general, especially from the standpoint of education, health, and maintenance. *Five hours a week, spring quarter.* Professor Sanders.

Courses Primarily for Graduates

208 (108). METHODS IN SOCIAL RESEARCH.
Outlines of social research including the spirit of scientific research, social research and the new alignment of the social sciences, the historical approach to the social sciences, the qualifications of the social research specialist, the divisions and general methods of social science, types of method and approach; the statistical, the survey, the experimental, the case; the biological, the psycho-

logical, the anthropological or comparative, the historical; the range of general sources, research agencies and groups, reading and bibliography as tools, the utilization of notes and records, schedules, questionnaires and forms, common sense technique, preparation of manuscript and publication, examples of social research and bibliographies. *Five hours a week, fall quarter.* Professor Odum.

209 (109). SOUTHERN REGIONAL SOCIAL PROBLEMS.
An extended survey of the field of regional social problems in the Southern States, classified and grouped under certain sociological categories and physical backgrounds, cultural patterns, processes of social change, social incidence, individual and social differentiation, institutions and leadership, social programs, social science, and social research. Topical analysis and extensive questions supplemented with concrete data and special thorough study of given selected problems. *Five hours a week, winter quarter.* Professor Odum.

210. FOLK SOCIOLOGY.
A study of collective representations and processes attempting descriptive accuracy primarily through portraiture and analyses. The primary basis of the course will be concrete materials related to folk attitudes and cultures, ranging from primitive folklore and folk wisdom to regional culture patterns. The chief objective is an attempt to seek certain contributions to social theory as related to the building of cultures. *Five hours a week, spring quarter.* Professor Odum.

215. SOCIAL DEMOGRAPHY.
The course attempts to synthesize the emerging concepts of culture and the region by depicting the resulting cultural landscape. The contributions of cultural anthropology, social geography, regional sociology, and human ecology are studied in an effort both to evaluate the socially significant factors of the environment and to arrive at a classification of regions, culture areas, and social types. The American South is used as a type study for the survey of regions in transition. *Five hours a week, winter quarter.* Professor Vance.

251 (105). SOCIAL ANTHROPOLOGY.
The origin, content, and distribution of culture; the modern cultural environment; southern regional culture traits. *Five hours a week, winter quarter.* Professor Johnson.

253. STATISTICS.
An advanced course in statistical method. The sources of social statistics, data gathering and tabulation, elementary graphics, averages and measures of variation, index numbers, linear trends, linear correlation, probable errors. Prerequisites, Sociology 41, 42, and 53, or its equivalent. *Five hours a week, winter quarter.* Professor Woofter.

327, 328, 329 (127, 128, 129). GRADUATE RESEARCH SEMINARS.
Research in selected topics. *Five hours a week, fall, winter, and spring quarters.* Professor Odum.

331, 332, 333 (130, 131, 132). GRADUATE RESEARCH SEMINARS.
Research in selected topics. *Five hours a week, fall, winter, and spring quarters.* Professor Groves.

334 (134). EUROPEAN SOCIOLOGY.
The development of social thinking from the earliest times to the present with particular emphasis upon recent trends and schools. (Not given in 1931-1932.) *Five hours a week, fall quarter.* Professor Bernard.

335 (135). AMERICAN SOCIOLOGY.
Social thought in the nineteenth and twentieth centuries, stressing especially the recent tendencies in sociological theory and investigation. (Not given in 1931-1932.) *Five hours a week, winter quarter.* Professor Bernard.

336 (136). RECENT SOCIOLOGICAL THEORY.
An intensive developmental study of some phase of recent sociological theory. The field selected will vary from year to year. (Not given in 1931-1932.) *Five hours a week, spring quarter.* Professor Bernard.

341 (141). SEMINAR. Individual research in a special field under the direction of a member of the department.

DEPARTMENT OF ZOÖLOGY

HENRY VANPETERS WILSON, ROBERT ERVIN COKER, Professors.

*CHARLES DALE BEERS, Associate Professor.

JOSEPH MANSON VALENTINE, Assistant Professor.

Those who find themselves strongly interested in zoölogy will meet with opportunities for teaching and investigation in several of the subdivisions of present-day universities, such as college, technological, medical, and graduate schools. Others will find their best opportunity, especially if their interest centers around problems of cellular biology, in research institutions of a more or less medical character. Museums need the service of many zoölogists as curators. Curators are expected to acquire intimate and extensive knowledge of the classification and natural history of some particular group. Somewhat the same kind of specialization is demanded of those who are drawn into institutions for the betterment of public health, some concentrating on the parasitic worms, etc. There is, finally, much work of an economic nature that is carried on by zoölogists in the service of national and state bureaus, such as the U. S. Bureau of Fisheries and the several bureaus under the U. S. Department of Agriculture.

The department occupies, along with the Department of Botany, the biological building, known as Davie Hall. The department is provided with the usual equipment of books, collections, and instruments, including excellent photographic apparatus, for graduate work. The departmental library receives the American and the more important foreign journals. It has a good working collection of treatises and monographs and a large collection of reprints. The department is prepared to direct research on the general problems of cellular biology as presented in the embryological and regenerative process of animals, more especially the lower metazoa (sponges and coelenterates) and lower vertebrates (fishes and amphibia); on the ecology of lower aquatic animals; on the phenomena of variation as exemplified in the classification of sponges, and on the life-cycles of

* Absent on leave, 1930-1931.

protozoa from the comparative and experimental standpoints. Investigations along these lines have now been carried on for many years. The published records have appeared from time to time in the zoölogical journals (*Journal of Morphology, Journal of Experimental Zoölogy, Memoirs Museum Comparative Zoölogy, Bulletin U. S. Bureau of Fisheries, Bulletin U. S. National Museum, Anatomischer Anzeiger, Journal Elisha Mitchell Scientific Society, American Naturalist, Proceedings National Academy of Sciences, British Journal of Experimental Biology*, etc.) and the chief data have been incorporated in treatises that are in general use. Opportunity to carry on investigations at the seaside may usually be obtained during the summer at the biological station of the U. S. Bureau of Fisheries situated at Beaufort, N. C.

The courses listed below are such as lead more especially to the master's degree (A.M. or S.M.). For the Ph.D. degree the essential requirement is that the candidate shall have such a grasp of the concepts and methods of zoölogy as will enable him independently to acquire knowledge of some importance that is new to science. This depends not only on manipulative skill and experience but also on ability to handle the literature of the subject, the treatises, handbooks, and especially the current journals. A reading knowledge of French and German is required of candidates for the Ph.D. degree.

Courses for Graduates and Advanced Undergraduates

103 (3). COMPARATIVE ANATOMY OF VERTEBRATES. Prerequisite, Zoölogy 41ab and 42ab.
Dissection of types, especially amphioxus, petromyzon, fish, fowl, rabbit. Laboratory work with occasional lectures. *Ten laboratory hours a week, fall quarter. Laboratory fee, $5.00.* Professor Beers.

104 (4). COMPARATIVE EMBRYOLOGY OF VERTEBRATES. Prerequisite, Zoölogy 41ab and 42ab.
Maturation and fertilization phenomena in some invertebrate types; segmentation and formation of germ layers in frog and teleost fish; germ layers and development of characteristic vertebrate organs in chick; essentials of microscopic technique. Laboratory work with occasional lectures. *Ten laboratory hours a week, winter quarter. Laboratory fee, $5.00.* Professor Beers.

105 (5). COMPARATIVE HISTOLOGY OF VERTEBRATES. Prerequisite, Zoölogy 104.
Microscopic preparations of selected tissues and organs are made from the fresh animal and studied with the help of texts and original papers. Laboratory work with assigned reading and seminar reports. *Ten laboratory hours a week, spring quarter. Laboratory fee, $5.00.* Professor Beers.

106-107-108 (6-7-8). MORPHOLOGY AND CLASSIFICATION OF THE INVERTEBRATES. Prerequisite, Zoölogy 41ab and 42ab.
Dissection and microscopic study of types of the chief orders, with some consideration of life histories; systematic diagnosis. Laboratory work with occasional lectures. *Ten laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00.* Professor Wilson.

109 (9). INTRODUCTION TO HYDROBIOLOGY. Prerequisite, Zoölogy 41ab and 42ab.

A study of animal life in water, with special reference to the relation of animals to each other and to their environments. Field and laboratory work, lectures, reading of special papers, discussions. *Five hours (lectures and equivalent laboratory) a week, fall quarter. Laboratory fee, $5.00.* Professor Coker.

110 (10). INTRODUCTION TO PROTOZOÖLOGY. Prerequisite, Zoölogy 41ab and 42ab.

A consideration of the structure, classification, and life histories of the one-celled animals, with special reference to those of medical importance—in particular, the intestinal protozoa and the causative agents of malaria and the sleeping sickness. *Lectures and demonstrations, five hours a week, winter quarter.* Professor Beers.

Courses Primarily for Graduates

209-210-211 (109-110-111). GENERAL EMBRYOLOGY AND REGENERATION.

Embryology and regeneration in the lower metazoa and simpler vertebrates. *Not less than ten laboratory hours a week, fall, winter, and spring quarters. Seminar reports. Laboratory fee, $5.00 a quarter.* Professor Wilson.

212-213-214 (112-113-114). HYDROBIOLOGY. Prerequisite, Zoölogy 109.

The study of aquatic organisms and environments, with attention restricted to a particular topic, as a small group of animals, a limited set of habitats, or special phenomena of behavior. The work is on the border line of research, involving critical examination of literature, as well as field and laboratory study and seminar reports. *Ten laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $5.00 a quarter.* Professor Coker.

215 (115). PROTOZOÖLOGY.

Special study of the protozoa living in man and lower animals, with consideration of host-parasite relationships and with comparative studies on a few free-living forms. Laboratory work with occasional lectures, assigned readings, and seminar reports. *Ten laboratory hours a week, fall or spring quarter. Laboratory fee, $5.00.* Professor Beers.

316 (116). RESEARCH.

Under this heading may be credited the work of a single quarter or that of one or more years. *Six or ten or more laboratory hours a week, fall, winter, and spring quarters. Laboratory fee, $3.00 or $5.00.* Professor Wilson or Professor Coker or Professor Beers.

ADDITIONAL COURSES FOR GRADUATE CREDIT

Certain courses in the professional schools may be elected as minors for graduate credit, with the permission of the committee under which the student is working and the administrative board.

In the School of Law the following courses are open to properly qualified graduate students: Negotiable Instruments, Municipal Corporations, Carriers, Insurance, Sales, Corporations, Constitutional Law, Criminal Law, Evidence, Persons.

In the School of Medicine the following courses are open to graduate students who present the proper prerequisites as minors for the master's and doctor's degree:

NEURO-ANATOMY. Offered by Professor Mangum. *120 hours.* Prerequisites: Zoölogy 1 or its equivalent.

HISTOLOGY. Offered by Professor George. *156 hours.* Prerequisites: two courses in biology, including zoölogy.

EMBRYOLOGY. Offered by Professor George. *93 hours.* Prerequisites: two courses in biology, including zoölogy.

PHARMACOLOGY. Courses 2 and 3, which constitute one course. Offered by Professor MacNider. *243 hours.* Prerequisites: Physiology and Bio-Chemistry 1 and 2.

BACTERIOLOGY 2. Offered by Professor MacPherson. *150 hours.* Prerequisites: Chemistry 1, 2, 31, and one course in biology.

BACTERIOLOGY 4. Immunology. Offered by Professor MacPherson. *99 hours.* Prerequisites: Bacteriology 2.

PATHOLOGY 1. Offered by Professor Bullitt. *275 hours.* Prerequisites: histology, bacteriology, and physiology.

The Department of Physiology offers to students majoring in biology or chemistry a minor in (a) physiology (b) bio-chemistry, consisting of the following courses:

(a)

PHYSIOLOGY I. The lectures cover the physiology of the digestive, circulatory, and respiratory systems with some preliminary considerations of the nervous systems. Prerequisites: Zoölogy 3, Bio-Chemistry 1. *Six lectures a week, fall quarter.*

PHYSIOLOGY II. The lectures cover the physiology of the execretory and endocrine systems, metabolism, temperature regulations, the central nervous system, and the special senses. *Six lectures a week, winter quarter.*

PHYSIOLOGY III. The experiments deal with certain phenomena of the neuro-muscular mechanism, of the nervous, circulatory, and respiratory systems. *A laboratory course, six hours a week, fall quarter.*

PHYSIOLOGY IV. The experiments deal with certain phenomena of the circulation, respiration, and metabolism demonstrable on man. *A laboratory course, five hours a week, winter quarter.*

(b)

BIOLOGICAL CHEMISTRY 1. Composition of the body: general considerations, carbohydrates, fats, proteins, salts, etc. *Three one-hour lectures and two three-hour laboratory periods weekly, winter quarter. Laboratory fee, $10.00.* Professor Brooks.

BIOLOGICAL CHEMISTRY 2. Chemistry of digestion and metabolism: special emphasis is placed on the analytical examinations of gastric contents, blood, and urine. *Three one-hour lectures and one six-hour laboratory period weekly, fall quarter. Laboratory fee, $10.00.* Professor Brooks.

BIOLOGICAL CHEMISTRY 3. Quantitative methods of blood and urine analyses. *Two lectures and two three-hour laboratory periods weekly, fall, winter, or spring quarters. Laboratory fee, $5.00.* Professor Brooks.

Prerequisites: Chemistry 1, 2, 31, 42, 61, 62, or their equivalents.

TEACHING FELLOWS, 1930-1931

Andrew Clark Mathews, A.B., *Botany.*
*George Hoenshel Fleming, S.B., *Chemistry.*
Joseph Nisbet Le Conte, S.M., *Chemistry.*
†William Franklin Smith, A.M., *Chemistry.*
James Otho Turner, A.B., *Chemistry.*
Philip Macon Cheek, A.M., *Classics.*
Harry Gray Brainard, S.B., *Economics.*
Donald Fraser Martin, Jr., A.B., *Economics.*
Ralph Muse Lyon, A.M., *Education.*
John Baptist Pittano, S.B., *Engineering.*
John Walter Scott, A.B., *English.*
George Frank Sensabaugh, A.M., *English.*
Mitchell Preston Wells, A.B., *English.*
William Thompson Holland, S.M., *Geology.*
Ralph Stokes Collins, A.B., *German.*
Maxcy Robson Dickson, A.B., *History and Government.*
Auxford Sumner Sartain, A.M., *History and Government.*
Vernon Lane Wharton, A.B., *History and Government.*
Charles Alexander Denson, A.B., *Mathematics.*
Robert Lee Garrett, A.M., *Mathematics.*
Henry Herman zurBurg, A.B., *Physics.*
George Glenn Killinger, A.B., *Psychology.*
Norman Wilson Lyon, A.M., *Psychology.*
Walter Devereaux Creech, Jr., A.M., *Romance Languages.*
David Franklin McDowell, A.M., *Romance Languages.*
Percy Wise, A.B., *Romance Languages.*
Lyle Lyndon Williams, A.M., *Zoölogy.*

ASSISTANTS IN INSTITUTE FOR RESEARCH IN SOCIAL SCIENCE‡

Columbus Andrews, A.M.
Ina Vivian Young, A.B.

GRADUATE ASSISTANTS

Nell Quinby Henry, A.B., *Botany.*
Robert Herschel Belcher, S.B., *Chemistry.*
Ralph Milledge Byrd, S.M., *Chemistry.*
¶George Hoenshel Fleming, S.B., *Chemistry.*
Esmarch Senn Gilreath, A.M., *Chemistry.*
Clive Vergil Harrill, A.B., *Chemistry.*
Ausker Edward Hughes, S.M., *Chemistry.*
Thomas Luther King, S.M., *Chemistry.*
Harvey Albert Ljung, S.M., *Chemistry.*
William Judson Mattox, A.M., *Chemistry.*
Jeptha Sanders, S.M., *Chemistry.*
William Rudolph Curtis, A.B., *Economics.*
Andrew John Mahler, A.M., *English.*

* Appointed January 1, 1931.
† Resigned January 1, 1931.
‡ Includes only those registered in the Graduate School.
¶ Resigned January 1, 1931.

GEORGE FREDERICK HORNER, A.M., *English.*
SAMUEL JESSE MCCOY, M.A., *English.*
ALEXANDRE EMIL ALEXANDER, A.B., *Geology.*
KENNETH RHODES BYERLY, B.B.A., *Geology.*
CHARLES STEWART MAURICE, A.B., *Geology.*
ABRAM GUSTAVUS BAYROFF, A.M., *Psychology.*
BLANCHE CLARE ZORN, B.S., *Psychology.*
SELMA LEE FULLER, A.M., *Zoölogy.*
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† Resigned February, 1931.
‡ Appointed March, 1931.